



United States
Department of
Agriculture

In cooperation with the
Montana Agricultural
Experiment Station

MT639—Soil Survey of Sweet Grass County Area, Montana



Natural
Resources
Conservation
Service



Part I



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

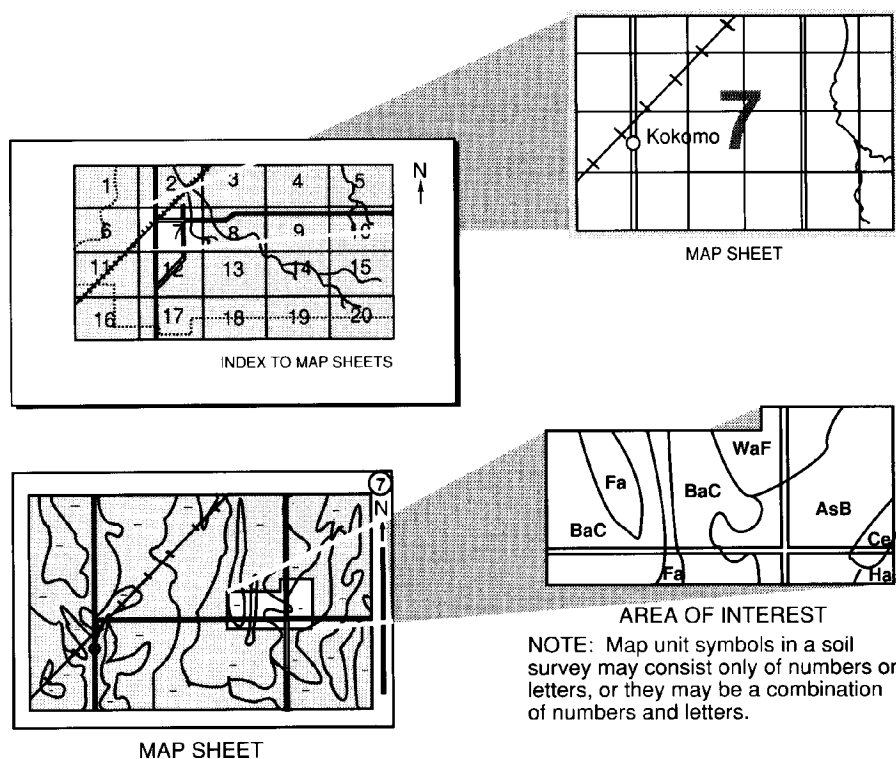
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1997. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Sweet Grass County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Two dominant features of the Sweet Grass County landscape are the Yellowstone River and Crazy Mountains. The river valley soils in this view are mainly Fairway and Korchea loams. Soils that are commonly found in the rangeland are Cabbart loam, Yawdim clay loam, and Reedpoint very channery loams. The high terraces in the background are mostly Roy and Tamaneen cobbly loams. Representative soils in the upper foothills are Adel loam on the rangeland and Stemple very cobbly loam in the forested areas.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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For tables with the most current data, please visit the
Soil Data Mart at <http://soildatamart.nrcs.usda.gov/>.

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Dave White
State Conservationist
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Soil Survey of Sweet Grass County Area, Montana

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Montana Agricultural Experiment Station

SWEET GRASS COUNTY AREA is located in south-central Montana (fig. 1). The county has an area of about 1,224,166 acres, or 1,912 square miles, of which about 904,100 acres, or 1,412 square miles, is included in the soil survey. The soil survey area is bounded by the Gallatin National Forest on the south and northwest, Park County on the west, Wheatland County on the north, Golden Valley County on the northeast, and Stillwater County on the east. Big Timber, the centrally located county seat and principal town, lies at the confluence of the Yellowstone and Boulder Rivers. In 2000, Sweet Grass County's population was 3,609.

The Sweet Grass County Area lies where the Missouri Plateau of the Great Plains physiographic province is met by the Middle Rocky Mountains and Northern Rocky Mountains physiographic provinces (Smith, 1983). The surface features of the county are largely the result of cretaceous marine sedimentation and cretaceous and tertiary igneous intrusion and volcanoclastic sedimentation and cretaceous and tertiary folding and faulting. Erosion has altered these features and has helped produce major stream valleys, including the Yellowstone River valley. Most of the survey area is drained by the Yellowstone River. The extreme northern portion of the county is drained by the Musselshell River.

This soil survey supersedes the Soils of Sweet Grass County, Soil Reconnaissance of Montana, Preliminary Report (Montana State College, 1956). It provides additional information and has larger maps, which show the soils in greater detail.

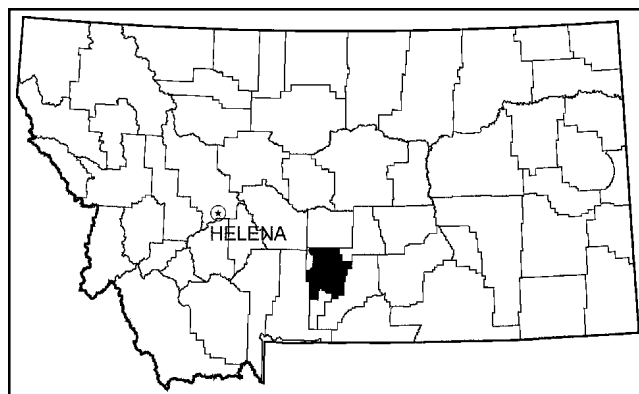


Figure 1.—Location of Sweet Grass County Area, Montana

General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history and development; industry, transportation, and recreation; natural resources; physiography, drainage, and geology; mining; oil, gas, and coal; geothermal resources; ground-water resources; seismicity; and climate.

History and Development

The area that now includes Sweet Grass County was inhabited by the Crow and Blackfoot Nations prior to settlement by immigrants.

The Lewis and Clark Expedition brought the first-known visitors of European descent into the area. In 1806 on his return from the Pacific Coast, Captain William Clark camped along the Yellowstone River near its confluence with the Boulder River and Big Timber Creek, near the present-day town of Big Timber. Clark named Big Timber Creek for the large cottonwood trees growing at its mouth. From 1806 to 1850, the only explorers to venture into the area were hunters, trappers, and Indian traders.

In 1867, the first treaty fort was built in the Sweet Grass County area at the mouth of Otter Creek. In 1869, the area was included in the first Crow Indian Reservation.

In the late 1860s, the first trail herds from Texas began coming into the area. The decade from 1870 to 1880 was the boom of the cattle industry, the range wars, and the "Wars for the West." The early cattle companies were large and grazed their cattle on the open range. Prior to the turn of the century, the public domain was controlled by stockmen and early miners until homesteader settlement and the establishment of the Forest Reserve System effectively closed the open range.

The early 1880s brought the railroad into Sweet Grass County and the population of the area grew and prospered. The town of Big Timber was established and for a short time became the largest wool-shipping center in the United States.

Mining played an important role in the early development of the county. In the 1890s, the Independence Mining Company was established in the Upper Boulder River valley. Eventually the camp supported between 400 and 500 miners. Mining continues to play an important role in the regional economy due to the presence of a major platinum-palladium deposit in the southern part of the county.

The Homestead Act brought scores of settlers, many from Minnesota, into the area between 1890 and 1910. The Melville community was established at this time. The majority of settlers were of Norwegian descent. The settlers plowed up the prairie and planted it to wheat and other small grains. Around 1911, the state's first dude ranch was established in the eastern foothills of the Crazy Mountains. Dude ranching has remained an important industry in the county.

From the 1920s until the present, the county has progressed with developments in technology. Today, agriculture is the principal industry. Most of the land is used for livestock grazing.

Industry, Transportation, and Recreation

Since Sweet Grass County was established, ranching has been a major part of the economy. In 1993, there were 41,600 cattle, 19,100 sheep, and 4,600 hogs on farms and ranches. Cultivated agricultural land totaled 61,000 acres. Approximately 37,500 acres of this land was irrigated. Irrigated cropland is located near major river and stream valleys. Water for irrigation comes principally from canals, with water diverted from rivers and streams. Upper and Lower Glasston Lakes also are sources of water for irrigation. Alfalfa hay is the principal irrigated crop, while wheat and barley are the principal dryland crops. Dryland cropland is mainly located in the northeastern part of the county.

Some light industry is located in Big Timber. The town has an industrial park where small assembly plants and specialty firearm factories are located.

A major platinum-palladium mine is located south of Big Timber on the East Boulder River.

About 25 percent of the county is forested. Timber is a minor industry in the county because much of the forested land does not support commercial-grade timber. There are two small sawmills that produce a small amount of dimensional lumber, rough lumber, posts, and poles.

Interstate 90 runs east and west across the county along the Yellowstone River. U.S. Highway 191 extends north from Big Timber to Melville and through to the Wheatland County line. County Road 298 begins at Big Timber and extends south through McLeod to the Park County line. An extensive network of secondary roads provides corridors through the area. Montana Rail Link has a rail line that parallels the Yellowstone River. A public airport is maintained at Big Timber. The nearest commercial airline facilities are at Billings in Yellowstone County and at Belgrade in Gallatin County, between 75 and 85 miles distant.

The area's wilderness and natural scenic beauty, coupled with opportunities for outdoor recreation, have increased the importance of tourism in some parts of the county. The survey area borders the Absaroka-Beartooth Mountains in the southern part of the county and the Crazy Mountains in the northwestern part. Outdoor recreational opportunities are abundant. Dude ranches, campgrounds, hiking and packing trails, and snowmobile trails are available. Fishing and hunting are also attractions to the area with outfitting and guiding services providing seasonal employment for many residents.

Natural Resources

The most important natural resource in this survey area is the soil. Sweet Grass County consists of about 67 percent rangeland, 7 percent cropland, and 26 percent forestland.

Natural sources of water include springs, ponds, creeks, and rivers. Sweet Grass County has two rivers, the Yellowstone and the Boulder, and numerous creeks flowing through it. The rivers and creeks are used heavily for irrigation water. Many springs have been developed for livestock use.

Within the county, there are two reservoirs—Upper Glasston and Lower Glasston Lakes. They are used for recreation and irrigation-water management.

There are no known coal-, oil-, or gasfields that are being developed within Sweet Grass County. There are some coal and geothermal areas in the southern part of the county that may have the potential to be developed.

Gold, silver, chromium, platinum, palladium, copper, nickel, and zinc were all actively mined in the past. These deposits are located in the Crazy and Beartooth Mountains. Gold, silver, and chromium are still actively mined on a small scale. The western end of the Stillwater Complex and the contained platinum, palladium, copper, and nickel resources are found in the southeastern part of the county. This deposit is being developed at this time.

Sand and gravel deposits are plentiful. There are several small sand and gravel operations throughout the county.

Physiography, Drainage, and Geology

Marie V. Marshall, Montana State Geologist, Natural Resources Conservation Service, prepared this section.

Physiography

Sweet Grass County lies in a complicated structural setting at the intersection of three major physiographic provinces. They are the Northern Rocky Mountain Province, which includes the Crazy Mountains; the Middle Rocky Mountain Province, which includes the Beartooth Mountains; and the Unglaciated Missouri Plateau of the Great Plains Province, which extends to the east from the mountains.

The Yellowstone River flows from west to east, bisecting the county. The county contains parts of two

mountain ranges. The easternmost end of the Crazy Mountains extends from Park and Meagher Counties into the northwestern corner of Sweet Grass County. South of the Yellowstone River, the Beartooth Mountains occupy most of the southern part of the county.

The Beartooth Mountains extend 75 miles (120 km) from Livingston, on the northwest, to Red Lodge, on the southeast. Geologically, the Beartooth Mountains are subdivided into three separate blocks based on their structure and lithology. The soil survey area extends only into the tip of the northernmost North Snowy Block, which is composed of Paleozoic-aged sedimentary rocks with Precambrian granitic rocks further to the south. The South Snowy Block, which occupies the southwestern portion of the Beartooth Mountains, is composed of Precambrian granitic rocks overlain by Tertiary volcanic rocks. The Beartooth Block occupies the larger, southeastern portion of the Beartooth Mountains and is composed of Precambrian granitic rocks. This latter block is also referred to as the Beartooth Plateau. The Absaroka Range is an adjacent feature, which extends from Gardiner into northwestern Wyoming, consisting of the Yellowstone Plateau volcanics.

Not all of Sweet Grass County was included in the soil survey area. The areas excluded are the portions of the Crazy and Beartooth Mountains owned by the U.S. Forest Service. South of the Yellowstone River, the soil survey area extends up the Boulder River to the McLeod Basin, ending at Green and Baker Mountains.

The soil survey area can be divided into three distinct physiographic units with similar topography. South of the Yellowstone River, the topography is mountainous and rugged, with significant relief. The area north of the Yellowstone River, excluding the Crazy Mountains, is composed of gentler, hilly topography. The Cayuse Hills in the northeastern corner of the county are a distinctive series of ridges which dip gently to the southeast along the dip of the beds.

Within the county, elevations range from 3,755 feet (1,145 m) above sea level where the Yellowstone River flows out of the county, to a high of approximately 11,230 feet (3,423 m) at the summit of Crazy Peak. High peaks in the Crazy Mountains have elevations between 9,000 and 11,000 feet (2,740 and 3,355 m). Typical elevations of the high peaks in the Absaroka Range are between

10,000 and 11,500 feet (3,048 and 3,505 m). The East Boulder and Lake Plateaus have average elevations above 9,000 feet (2,743 m).

Within the soil survey area the highest point is the summit of Green Mountain, which has an elevation of 7,337 feet (2,236 m). Big Timber has an elevation of approximately 4,480 feet (1,365 m).

Drainage

Most of the county is drained by the Yellowstone River and its tributaries. The relatively small area northeast of the Cayuse Hills drains to the Musselshell River. The Crazy Mountains are drained by a number of small, radiating streams which flow into the Yellowstone River between Springdale and Big Timber. Approximately half of these tributaries are intermittent.

Major tributaries of the Yellowstone River include, from west to east, Big Timber Creek, which joins the Yellowstone River from the north at Big Timber; the Boulder River, which joins the Yellowstone River from the south at Big Timber; Sweet Grass Creek which joins the Yellowstone River near Greycliff; and Bridger Creek which joins the Yellowstone River near the eastern border of the county. The Yellowstone Valley is flat and wide throughout most of the county, ranging from 1 to 2 miles (1.6 to 3.2 km) in width. Downstream of its confluence with Bridger Creek, the Yellowstone River narrows to between $\frac{1}{2}$ and 1 mile in width. There are no dams in the county on the Yellowstone River or any of its major tributaries.

Geologic History and Regional Geology

The geologic history of Sweet Grass County began as the earth's crust cooled in the Archean Eon of the Precambrian Age. Geologists believe that the earth was formed approximately 4.5 billion years ago. In the vast amount of geologic time that has passed since then, most of these ancient rocks have been buried and recrystallized, obscuring their original textures and composition. The Precambrian rocks in southern Sweet Grass County were deposited under water in a large basin and subsequently folded and metamorphosed under high pressures and temperatures. Metal-rich dikes were emplaced along fractures during a period of volcanic activity that occurred about 2.7 billion years ago.

A long, quiet period followed, and the Precambrian Age drew to a close approximately 570 million years ago. The subsequent Paleozoic Era is marked by the first appearance of fossils of multicellular animals with hard parts. By middle Cambrian time, the Archean-aged rocks had been uplifted and eroded

into a featureless land surface, or peneplain, near sea level.

For much of Paleozoic time, most of Montana was slightly below sea level and covered by warm, shallow seas. Thick sequences of sediments were deposited on coastal plains and the shallow sea floor during alternating periods of rising and falling sea levels. In this area, the accumulation of sedimentary rocks is estimated to be nearly 4,000-feet (1,220-m) thick.

Sandstone was deposited in beach and near-shore environments; shale was deposited in lower energy, deep-water environments; and limestone was normally formed in warm, shallow water. The rock types grade both laterally and vertically into each other, and their thicknesses are not consistent across large areas. Organic matter, which was buried in the marine sediments, was eventually converted to oil and gas.

Sea level fluctuations across Montana continued throughout the Mesozoic Era. This was the time of the dinosaur. The shoreline moved back and forth across the nearly flat region. As it shifted, it created a complex interfingering pattern of sand and mud that was deposited along rivers, lakes, deltas, and coastal plains. Mesozoic sediments also contain coal, oil, and gas.

In the Late Cretaceous Period, a collision between major tectonic plates to the west created compressional forces that formed the Rocky Mountains. This regional northeast-southwest compression resulted in large-scale folding and faulting and is known as the Laramide Orogeny. Mountain-building activity at this time created the prominent structural features that exist today, including the downwarping of the Crazy Mountains Basin. As the mountains rose, rivers extended to the east and deposited enormous volumes of sediment on a gently sloping plain. Sandstone was deposited in river channels and dunes, and mud was deposited across the landscape during flood events.

The Laramide Orogeny continued throughout late-Cretaceous time into the early Tertiary, accompanied by intermittent, explosive volcanism. Deep-seated melting created masses of magma that rose into the upper crust. As it rose, it deformed the surrounding sedimentary formations, lubricated planes of thrust faulting, and, in many areas, mineralized the surrounding rock. Some of the magma rose to the surface, forming extrusive as well as intrusive igneous rocks. Cretaceous-aged volcanic rocks occur in the southern part of the soil survey area. Age dating of the Independence Stock shows that

volcanic activity was initiated 92 million years ago, with its main intrusive phase occurring 84 million years ago.

The Laramide Orogeny produced the most extensive volcanism that has occurred in western Montana, and it spread thick layers of volcanic ash over this area. Bentonite, which is derived from weathered volcanic ash, occurs in many of the Cretaceous-aged sediments, particularly the marine shales. It is found in layers from a few inches to a few feet thick.

The Cretaceous Period ended approximately 65 million years ago with a decline in the intense mountain-building activity and the extinction of the dinosaurs. While the fossils changed significantly, the deposition of massive amounts of sediment from the uplifting Rocky Mountains continued into the Cenozoic Era.

At the beginning of the Tertiary Period, there was still a shallow sea to the east and the climate was warm and wet. Swamps, containing abundant subtropical vegetation, developed along the rivers and the coastal plain. As the sluggish rivers shifted and meandered, this vegetation was buried by the accumulating sediment and eventually converted to coal.

Fifty million years ago, after a relatively quiet period in the early Tertiary, a major uplift occurred, caused by compressional forces from the west. Large fault systems and broad folds developed, and the Beartooth Block was uplifted. Geologists have estimated that the northeastern side of the Beartooth Block has been uplifted from 15,000 to 20,000 feet (4,570 to 6,100 m) (Simons and others, 1979).

At the same time, an enormous quantity of andesitic lava and other volcanic deposits were extruded in the South Snowy Block of the Beartooth Mountains. This volcanic sequence is known as the Absaroka Volcanic Field. It covers approximately 9,000 square miles (23,310 km²) and extends from the Gallatin Range of southwestern Montana into northwestern Wyoming. This volcanic belt lies along a Precambrian-age, northwest-trending zone of crustal weakness named the Cooke City Fault Zone, which determines its northeastern boundary. This regional zone of weakness apparently controlled the location of both volcanic and intrusive centers and the distribution of mineralized areas. Radioactive dates on these rocks range from 49 to 55 million years ago, or early to mid-Eocene.

The intrusive rocks that form the core of the Crazy Mountains were also emplaced at this time. The Crazy Mountains are composed of several

large igneous bodies with numerous sills, smaller intrusions, and dike swarms associated with them. Their composition is generally alkaline, and there are no extrusive rocks. The surrounding sedimentary rocks were upturned and baked during these intrusive events.

The climate turned mild and dry 40 million years ago, and large quantities of sediment were deposited across the Great Plains. Approximately 25 million years ago, the weather turned hot and wet and remained that way for 10 million years. Rolling landscapes developed as rivers began eroding valleys into a lush, tropical landscape. Then, 15 million years ago, the climate changed again, becoming extremely dry and probably colder. There was little plant cover, and flash floods spread blankets of gravel across the landscape, forming the high plains. Gravel choked the streams and no permanent channels could be established.

At the beginning of the Quaternary Period, the climate became wetter again. Plant cover was reestablished, minimizing erosion. Rivers and streams, including the Yellowstone River, became entrenched, beginning to form the channels we see today. Since then cold, wet intervals of ice advances have alternated with drier interglacial periods. Geologists estimate that there may have been up to 20 separate ice advances affecting Montana in the last 3 million years (Alt, 1984). During these ice advances, alpine glaciers covered the high peaks, eroding jagged ridgetops and U-shaped valleys and depositing linear moraines and glacial outwash in many valleys.

Today, Sweet Grass County is moderately quiet. Mountain building is active to the west, although in Sweet Grass County it is less intense. Minor faulting is still possible. There are active glaciers in the high peaks of both the Crazy and Beartooth Mountains. Presently, the streams are in a cycle of downcutting, depositing alluvium along stream channels and across flood plains during periods of flooding.

Geologic Structure

The principal geologic structures in Sweet Grass County are the Beartooth Uplift and the Crazy Mountains Basin. Immediately northeast of the Beartooth Mountains, Paleozoic sedimentary rocks are upturned and faulted in complex patterns. North of this faulted zone, the sedimentary rocks dip into the Crazy Mountains Basin, becoming progressively younger at the surface toward the center of the basin.

Minor folding, which appears at the surface of the Crazy Mountains Basin, covers more extensive

subsurface folding in older rocks. The rocks in the southeastern corner of the soil survey area dip southeast into the Reed Point syncline.

Several major faults transect the Beartooth Mountains in the southern portion of the county, including the Mill Creek-Stillwater Fault Zone, the Nye-Bowler Lineament, and the western tip of the Beartooth Fault. The Cooke City Fault Zone is a major structural zone that cuts through the interior of the Beartooth Uplift. This fault zone extends northwest from the Sunlight Basin in Wyoming through southern Sweet Grass County to the Mill Creek area south of Livingston.

Geologic Units

The sequence of sedimentary rocks exposed in the Sweet Grass County soil survey area is summarized below, in order of decreasing age. Formations are defined as a succession of strata distinctive enough to constitute a basic unit for soil survey, identified by similar rock type and stratigraphic section. Formations can be combined into groups or subdivided into members. Systems are the rocks deposited during a particular geologic period.

The Geologic Map of Montana (Ross, 1955), was used for the compilation of this report where newer geological data was unavailable. Descriptions and nomenclature of some of the rock units on this map have changed considerably since its publication; however, there has been little additional mapping published, particularly in the northern part of the county. Geologic mapping is ongoing in this area, so the designated outcrop areas may be changed; however, rock types associated with individual formations should remain consistent.

Representative soil series are listed for each formation, where possible. In some cases, outcrop areas for a particular formation are small and difficult to differentiate in the field. In these cases, no soil series are correlated with the formation.

Paleozoic "Ancient Life" System 570 to 245 million years ago (mya)

The oldest rocks in the soil survey area are Paleozoic rocks, which are exposed in the far southwestern corner of the soil survey area, on the northern flank of the Beartooth Mountains. Paleozoic rocks are carbonate rocks belonging to the Madison Group, consisting primarily of limestone, and can be seen forming the high cliffs near Natural Bridge. The Madison Group has been subdivided into two formations, the Lodgepole Limestone and the

overlying Mission Canyon Formation, and has a total thickness of 1,100 feet (335 m). Typical soils weathered from limestone include the Lap and Whitore series.

The remaining Paleozoic section in Sweet Grass County consists of approximately 1,000 feet (305 m) of soft sedimentary rocks that are individually thin and indistinct in outcrop. The older formations were deposited on the irregular topography caused by limestone dissolution in the Mission Canyon Formation when it was exposed at the surface. This dissolution caused erratic distribution and varying thicknesses of the sedimentary units.

Mesozoic "Middle Life" System 245 to 66 mya

Triassic Period (245 to 208 mya)

Rocks deposited during the Triassic Period were removed by erosion during the Jurassic Period; there are no Triassic rocks preserved in this area.

Jurassic Period (208 to 144 mya)

Jurassic-aged sedimentary rocks are thin and poorly exposed and crop out only in a thin band near the southern margin of the soil survey area. Consequently, they are not associated with any particular soil series. Sediments in the uppermost Morrison Formation represent the change from marine to nonmarine deposition in southern Montana.

Cretaceous Period (144 to 66 mya)

The oldest Cretaceous rocks belong to the Kootenai Formation. It is nonmarine and has been subdivided into two members. The lower member, the Pryor Conglomerate, is a massive, crossbedded unit between 25- and 40-feet (8- and 12-m) thick and is commonly ridge-forming. It consists primarily of chert-gravel conglomerate and sandstone. The upper member of the Kootenai Formation is a poorly exposed sequence of red, purple, green, and gray mudstone and shale with interbeds of sandstone, siltstone, and limestone. This upper member is between 220- and 260-feet (67- and 79-m) thick. Typical soils weathered from this formation include the Bridger and Danaher series.

The overlying Thermopolis Shale is a marine formation, consisting of a thin lower sandstone member, a middle shale member, and a thin upper sandstone member. This formation is approximately 500-feet (152-m) thick and consists primarily of the dark-gray shales of the middle member. The shales

weather to light gray and are distinguished from the overlying Mowry Shale by color. Mowry shales are brownish gray and weather to yellowish gray.

The Mowry Shale is between 430- and 500-feet (131- and 152-m) thick and is composed of dark-gray to dark-brown marine shale with minor interbeds of sandstone, siltstone, and bentonite. This shale was deposited in deep, quiet water and contains abundant fish scales. The Mowry and Thermopolis Shales are both easily erodible. They occur together in depressions between ridges formed by the more resistant sandstones in the underlying Kootenai and the overlying Frontier Formations. Landslides are prevalent in these shales and can be seen along the valley sides south of McLeod. There is a large slide affecting the Boulder River Road at the short graveled section at mile marker 22. Typical soils formed on these shale formations include the Linwell and Wayden series.

The overlying Frontier Formation consists of a sequence of thin-bedded, crossbedded greenish- and yellowish-gray calcareous sandstone with interbeds of siltstone, gravel conglomerate, and coal. It has a uniform thickness of 415 feet (126 m) in the Livingston-McLeod area; however, the upper part is not generally well exposed. The basal member is a 100-foot (30-m) thick sandstone unit which is exposed on the west side of the Boulder River valley near McLeod, called the Boulder River Sandstone. Typical soils weathered from this formation include the Castner and Reedwest series.

The overlying Cody Shale is a nonresistant sequence composed primarily of shale that forms grassy slopes and valleys. It consists of dark brownish-gray marine shale with thin interbeds of bentonite and sandstone, and it has a middle sandstone member named the Eldridge Creek Member that ranges in thickness from 90 to 120 feet (27 to 37 m). The formation has a total thickness ranging from 1,285 to 1,375 feet (392 to 419 m). Typical soils weathered from this formation include the Absarokee and Amherst series.

The Telegraph Creek Formation is a shallow-water marine siltstone that is transitional between the underlying Cody Shale and the overlying Virgelle Sandstone Member of the Eagle Formation. It is approximately 300-feet (91-m) thick and contains interbeds of sandstone, mudstone, and shale. The sandstone interbeds increase up section, eventually grading into the Virgelle Sandstone.

The Eagle Formation consists of well-bedded to massive, crossbedded sandstone with interbeds of

coal, carbonaceous mudstones, and tuff. Its basal member, the Virgelle Sandstone, is a persistent, light-gray sandstone that is hard and massive. The Eagle Formation has an average thickness of 600 feet (183 m) and was deposited in brackish water at the edge of a regressing sea in lagoons, deltas, swamps, and beaches. It is exposed in a large area south of McLeod and, in this area, contains mineable coal deposits. Typical soils weathered from this formation include the Cheadle and Lymanson series.

For the sedimentary rocks above the Eagle Formation, the state geologic map shows both continental and marine deposits of the same age in Sweet Grass County. The continental deposits lie to the west and have been assigned to the Livingston Group. Marine deposits that lie to the east have been assigned to the Montana Group. The Livingston Group consists of the Cokedale, Miner Creek, Billman Creek, and Hoppers Formations; these sedimentary rocks are composed primarily of volcanic fragments. Mapping of individual formations within the Livingston Group has not been extended into Sweet Grass County from the west, so they will not be differentiated here. The Montana Group is composed of the Claggett Shale, Judith River Formation, Bearpaw Shale, and Lennep Sandstone.

The Livingston Group contains a thick unit of volcanic rocks formed from a series of volcanic mudflows, or lahars, with volcanic breccias. It consists of angular fragments of dark-gray andesite suspended in mud and volcanic ash. This assemblage of volcanic rubble is known as "Weed's Agglomerate" or the "Livingston Igneous Series," and it occurs in a large block to the south and southeast of Big Timber, extending just to the north of, and beyond, Nye. It is well exposed in the high cliffs approximately 8 miles (13 km) south of Big Timber on the Boulder River Road. Its stratigraphic position within the Livingston Group is still uncertain and it has not been assigned to a particular formation. Typical soils weathered from this formation include the Pianohill and Weedzunit series.

The marine sedimentary section assigned to the Montana Group consists of from 1,850 to 2,150 feet (564 to 655 m) of interbedded sandstone, siltstone, and shale. They are exposed in a thin band northwest and southeast of McLeod and are covered by Cretaceous volcanics to the northeast. They are also exposed in the South Fork of Big Coulee Creek, in the northeastern corner of the county.

The Claggett Shale consists of soft, light-gray marine shales with thin, light-gray or white sandstone

interbeds. It is over 400-feet (122-m) thick. Typical soils weathered from this formation include the Wayden and Work series.

The Judith River Formation consists of light-colored, interbedded sandstone and sandy shales that are locally carbonaceous. It has a basal sandstone, the Parkman Sandstone, that is a soft, massive, buff sandstone with hard, dark concretions; the sandstone is up to 300-feet (91-m) thick. The full thickness of the formation is approximately 600 feet (183 m).

The Bearpaw Shale is composed of from 600 to 700 feet (185 to 215 m) of gray to black, bentonitic shales containing calcareous concretions. It forms the broad valley in the upper portion of the South Fork of Big Coulee Creek. Typical soils weathered from this formation include the Kobase and Tanna series.

The Lennep Sandstone, which in this area may be equivalent to the lower Hell Creek Formation, is the youngest unit to be designated in the Montana Group. It is a marine deposit that consists of dark-colored, tuffaceous sandstone with thin interbeds of dark shale. It is ridge-forming and varies in thickness from 250 to 460 feet (76 to 140 m), overlying the softer, erosive shales of the Bearpaw Formation. Typical soils weathered from this formation include the Hinterland and Reedpoint series.

The Hell Creek Formation overlies the Lennep Sandstone and is the youngest sedimentary formation of the Cretaceous Period. It outcrops in the eastern half of the county in a broad, northwest-trending band straddling the Yellowstone River for several miles on either side. It is from 500- to 750-feet (152- to 230-m) thick and is composed primarily of soft, fine- to medium-grained, gray to brown lenticular beds of sandstone, interbedded with green to gray claystone and sandy shale. Sandstone beds are often over 25-feet (8-m) thick. Thin, discontinuous coal seams, carbonaceous shales, and bentonite are also common within the formation. Unsurfaced roads in the Hell Creek Formation tend to be quite slick when wet. Typical soils formed on the sandstone bedrock include the Delpoint and Rentsac series. Typical soils formed on the shale bedrock include the Megonot and Yawdim series.

Cenozoic "Recent Life" System

66 mya to present

Tertiary Period (66 to 1.6 mya)

The Fort Union Formation contains the oldest rocks from the Tertiary Period. This formation is nonmarine and consists of approximately 6,600 feet (2,012 m) of sandstone and conglomerate

interbedded with siltstone and mudstone. These sediments were deposited on an extensive flood plain, and the individual beds tend to be lenticular, with limited areal extent. Many are poorly cemented.

The Fort Union Formation covers approximately the northeastern quarter of the soil survey area; it extends from Big Timber north and east to near the eastern border of the county. Further geologic mapping will probably extend this formation to the west toward the Crazy Mountains. In other areas of Montana, the Fort Union Formation has been subdivided on the basis of color, rock type, and the occurrence of coal; however, further geologic mapping is required to delineate these subdivisions in Sweet Grass County.

The Tertiary-aged igneous complex that forms the core of the Crazy Mountains contains a varied assemblage of intrusive rocks. The southern end of the Crazy Mountains is formed by the Big Timber Stock, which consists primarily of diorite, a medium-colored, coarse-grained rock that is low in silica. In Sweet Grass County south of the high peaks, there are a number of smaller intrusions and large, vertical dike swarms associated with the main stock that have intruded and metamorphosed the surrounding sediments. Their composition is higher in sodium and potassium than the main intrusion. The intruded sediments have been baked and hardened to a hornfels, which is as hard and resistant to erosion as the surrounding igneous rocks. Typical soils formed from these hard, volcanic rocks are the Perma and Whitlash series.

The Absaroka Volcanic Field covers the South Snowy Block of the Beartooth Range and is exposed in the southern part of Sweet Grass County. The Absaroka Volcanic Field is composed of large volumes of andesitic lava flows, volcanic breccias, and tuffs, with small, localized intrusive necks, dikes, and sills. The andesite flows consist of platy, dark-gray, porphyritic rocks. Porphyritic rocks contain large crystals in a fine-grained groundmass. The breccias contain coarse, angular volcanic blocks in a rusty weathering matrix. Typical soils weathered from these volcanic rocks include the Arrowpeak and Timberlin series.

Quaternary Period (1.6 mya to present)

There are a variety of surficial Quaternary deposits located within the soil survey area. They consist primarily of alluvium, terrace deposits, and glacial moraines and outwash. They are generally unconsolidated and relatively thin. Only the major drainages contain significant amounts of Quaternary-aged alluvium.

There are unconsolidated terrace deposits on some valley sides and upland areas of the Yellowstone River valley. They are remnants of former flood plains of both the Yellowstone and Boulder Rivers and consist primarily of partially cemented, rounded gravel and cobbles. Two separate terrace levels of the Yellowstone River can be seen in the Big Timber area. The Yellowstone River terraces include the low terrace underlying the towns of Springdale and Big Timber and the terrace at Airport Flats, 500 feet (152 m) above the Yellowstone River. McKenzie Flats is considered to be a terrace deposit of the Boulder River.

Age dating of these surfaces was performed using weathering rinds on cobbles within the gravel deposits and on accumulations of caliche. This data shows the Big Timber surface to have formed approximately 140,000 years ago and the higher terrace at Airport Flats to have formed 1.5 million years ago (Rayne, 1995). Two intermediate terrace levels of the Yellowstone River have been mapped between Springdale and Livingston; however, they are missing in Sweet Grass County. Soils formed in older terrace deposits are the Sweetgrass and Tamaneen series. Soils formed in younger terrace deposits include the Roy and Turner series.

There are glacial deposits in both the Crazy and Beartooth Mountains. They are primarily moraine, which is a hummocky, unsorted deposit that covers valley bottoms and extends up adjacent slopes. There is a good example of a moraine in the vicinity of the old school near Elk Creek on the East Boulder River and in the Crazy Mountains northwest of Melville between Sweet Grass Creek and American Fork. Soils formed in glacial moraines include the Shawmut and Stemple series.

Alluvial deposits formed in the last 10,000 years can be found along the Yellowstone River and its tributaries, although the most extensive are in the flood plains of the Yellowstone River and lower portions of the Boulder River. These deposits are unconsolidated and consist of sand and gravel with local lenses of silt and clay. Typical soils weathered from these deposits include the Meadowcreek and Nesda series.

Mining

Mining activity in Sweet Grass County has primarily occurred in the mountains outside of the soil survey area; however, mining has had a significant impact on the development of the county. Mining activity has consisted primarily of exploration associated with the Stillwater Complex deposits in

Stillwater County and gold and silver mining in the Beartooth Mountains and on the eastern side of the Crazy Mountains.

The Stillwater Complex crops out in Park, Sweet Grass, and Stillwater Counties in an area 28-miles (45-km) long by 5-miles (8-km) wide along the northern edge of the Beartooth Mountains. This area contains a diverse assortment of mineral deposits associated with an unusual, layered ultramafic intrusion (rocks high in iron and magnesium thought to be weathered from the mantle) that was emplaced 2.7 billion years ago during the Archean Eon.

Historically, mining districts in this area produced gold, silver, arsenic, tungsten, copper, lead, zinc, and chromium; most of which was transported out of the area. The Stillwater Complex deposit contains all of the identified platinum-group element (PGE) resources in the United States; 75 percent of the identified chromium resources of the United States; and significant gold, silver, copper, lead, and zinc resources. PGEs include platinum and palladium, with lesser amounts of rhodium, ruthenium, osmium, and iridium. They are used as catalysts in petroleum refining and the chemical industry and in catalytic converters for automobiles. Because these metals are inert, they are also used in medical and dental applications.

The Independence Mining District, in southwestern Sweet Grass County, is one in a series of mining districts located in the Absaroka Volcanic Field along the northwest-trending Cooke City Fault Zone. This fault zone may have been a major eruptive center during the Eocene Epoch. Within this zone, mineralization and alteration were caused by hydrothermal solutions upwelling along existing fracture systems during Late Cretaceous and Eocene time.

In 1864, gold was discovered in the Independence Mining District, near the head of the Boulder River between Monument Peak and Baboon Mountain. The district included three mines that operated between 1900 and 1940 and produced minor amounts of gold, silver, and copper. The last mine was closed in 1942.

Small amounts of gold, silver, and copper were intermittently mined from the Natural Bridge District on the Boulder River between 1901 and 1937. Mining claims were first located here in 1882 when the area was excluded from the Crow Indian Reservation. Gold occurs in quartz-filled fissures in Precambrian metamorphic rocks. Exploration for Stillwater Complex mineralization is ongoing in this area as well.

The Deer Creek Mining District lies approximately 16 miles (26 km) south of Big Timber, on Upper Deer

Creek, approximately 3 miles (5 km) south of the soil survey area boundary. Prospecting for gold, silver, and copper has occurred in this district since the 1900s; however, the majority of the mining was in the 1920s. Exploration for copper is ongoing in this area.

In the 1940s, optical-quality calcite was mined from the upper Deer Creek drainage, 3 miles (5 km) north of Iron Mountain, for use in bomb sights manufactured by Norden for bomber aircraft. It was also mined locally for chicken grits. Most of the material was mined from veins cutting sedimentary rocks of the Livingston Group, but these veins also occur in the Livingston agglomerate unit. The calcite was deposited into open fractures by rising, low-temperature hydrothermal solutions associated with volcanic activity. The veins occupy faults and can be up to 20-feet (6-m) thick and traceable for several thousand feet.

The Big Timber District is several miles west of Half Moon Campground and encompasses the headwaters of Big Timber Creek in the Crazy Mountains. It is a relatively small district and contains gold, silver, lead, and copper. Exploration has continued in this district sporadically from the 1920s to the present.

Oil, Gas, and Coal

There are no producing oil- or gasfields in Sweet Grass County at this time. There has been some exploration over the years in the Crazy Mountains Basin, and a total of 79 exploration holes were drilled in the county between 1923 and 1992 (Montana Board of Oil and Gas Conservation, 1995). Forty-eight of these holes were dry; the rest had noncommercial shows of oil and gas. The deepest hole was drilled near Porcupine Butte in Section 6, T. 5 N., R. 13 E., to a total depth of 11,800 feet (3,597 m).

The Crazy Mountains Basin is composed of a very thick accumulation of sedimentary rocks, estimated to be nearly 30,000-feet (9,145-m) thick in the center of the basin. These sediments contain a significant amount of relatively porous sandstone. The basin is considered to have moderate potential for oil and gas development as there are mature petroleum source strata present at depth; there is permeable rock above the source strata that would allow petroleum migration; and structures are present that are normally associated with petroleum traps.

Unfortunately, the basin is structurally complex, and gentle folding of the Tertiary rocks at the surface obscures more complicated folding in the underlying,

older rocks. There are members of the oil and gas industry who remain optimistic about this area; however there is little ongoing exploration at this time. There is a significant amount of federal land south and northwest of Big Timber that has been leased to private industry for energy exploration.

Small amounts of coal were mined from the Eagle Formation, west of the Boulder River Road at Coal Mine Rim, 3 miles (5 km) south of McLeod. There is little published information about this mining; however it is assumed that this mining took place in the late 1800s and early 1900s, at the same time as the active coal mining in Cokedale, 25 miles (40 km) to the west.

Geothermal Resources

The McLeod Basin in the southern end of the soil survey area is approximately 45 miles (72 km) northeast of Gardiner, Montana, and the entrance to Yellowstone National Park. The park contains the largest geothermal system in North America, the Yellowstone caldera. There are no Known Geothermal Resource Areas (KGRAs) designated by the United States Department of the Interior in Sweet Grass County, although there are several thermal springs and wells.

These springs and wells include Hunter's Hot Springs, Anderson's Spring near McLeod, and the McLeod well. Hunter's Hot Springs is an old resort area that was closed in the late 1960s. It is currently used to heat greenhouses. It has a reported flow of 1,135 gpm (4,290 L/min) and a temperature of 138 degrees F (59 degrees C). Anderson's Spring at McLeod is currently undeveloped. It has a reported flow of 75 gpm (280 L/min) and a temperature of 77 degrees F (25 degrees C). The geothermal well at McLeod has a total depth of 2,250 feet (686 m). It is reported to flow at 1,135 gpm (4,290 L/min), with a temperature of 104 degrees F (40 degrees C).

Ground-Water Resources

The most productive water wells in Sweet Grass County are developed from alluvial gravels along the Yellowstone and Boulder River flood plains. North of the Yellowstone River, quantities of water suitable for stock and domestic use can be developed from sandstone beds within the Fort Union Formation, the Livingston Group, and the Hell Creek and Lennep Formations. In the relatively flat-lying beds in the Crazy Mountains Basin, well depth is partially dependent on the topography and, particularly, on the

proximity of the well to the nearest stream. In general, drilling on ridgetops or divides results in the deepest wells with the greatest pump lifts in the area.

South of the Yellowstone River, water can be developed from formations composed primarily of sandstone. Shale formations are saline and impermeable and are not reliable aquifers. In a limited area at the south end of the soil survey area, the Madison Limestone is capable of significant yields.

Well use, current to May, 1995, for Sweet Grass County is summarized below. This information is contained within the database maintained by the Montana Groundwater Information Center at the Bureau of Mines and Geology in Butte. A total of 965 well records are recorded. Many wells have multiple uses, most commonly domestic and stock water, so the sum of the uses appears to be greater than the total number of wells.

WATER USE	NUMBER OF WELLS
Domestic	594
Stock water	462
Irrigation	81
Unused	22
Public water supply	6
Industrial	3
Monitoring	3
Commercial	2

No wells had reported yields of greater than 1,000 gpm (3,780 L/min); 8 wells had reported yields of greater than 100 gpm (378 L/min); and 273 wells reported yields greater than 20 gpm (76 L/min). Ten wells had total depths greater than 1,000 feet (305 m); 42 had total depths greater than 250 feet (76 m); and 216 had total depths greater than 100 feet (30 m). A total of 402 wells had yields between 1 and 10 gpm (4 to 38 L/min).

Seismicity

Sweet Grass County lies a few miles east of the Intermountain Seismic Belt, which contains most of the known active faults in Montana, Idaho, Wyoming, and Utah. Most seismicity maps published by the United States Geological Survey or other sources list Sweet Grass County in the moderate to minor earthquake risk categories. Seismic potential of the area decreases to the northeast, away from the Hebgen Lake-Yellowstone National Park area.

The Earthquake Studies Office of the Montana Bureau of Mines and Geology maintains a network of seismographs throughout Montana. Information provided by the Earthquake Studies Office shows

a total of 11 earthquakes recorded in Sweet Grass County since the network began in 1982. Their Richter magnitudes range between 1.5 and 3.0. Earthquakes with magnitudes of 2.0 or less are known as microearthquakes. They are not commonly felt and are recorded only on local seismographs. It is unusual for earthquakes with magnitudes under 4.5 to cause any significant damage. While this historical record is very short, there is evidence to indicate a moderate to low risk of seismicity in Sweet Grass County.

Climate

Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon, prepared this section.

Climate tables were created from climate stations Big Timber, located in the southern portion of this soil survey area, and Melville 4W, located in the northern portion.

Thunderstorm days, relative humidity, percent sunshine, and wind information were estimated from First Order station Billings.

The "Temperature and Precipitation" table gives data on temperature and precipitation in the survey area, as recorded at Big Timber and Melville in the period 1971 to 2000. The "Freeze Dates in Spring and Fall" table shows probable dates of the last freeze in spring and the first freeze in fall. The "Growing Season" table provides data on length of the growing season.

In the Sweet Grass County soil survey area, summers are generally warm with frequent hot days on the plains. In the foothill and mountain areas, summer temperatures are cooler. Throughout the soil survey area, most precipitation falls as rain during the warmest part of the year. Rain is normally heaviest in late spring and early summer. In some years, summer hailstorms cause local damage to crops.

In summer, the average temperatures are 66.7 and 59.3 degrees F, respectively, at Big Timber and Melville. The average daily maximum temperatures in summer are 83.2 and 73.2 degrees F, respectively. The highest temperatures on record were 110 degrees F at Big Timber on July 21, 1931, and 93 degrees F at Melville on July 28, 1999.

During winter on the plains, brief periods of very cold weather occur when arctic air moves in from the north or northeast. Cold periods alternate with milder periods that occur often when strong westerly winds are warmed as they move downslope. In the foothill and mountain areas, winters are colder, with less periods of milder weather. On the plains, winter snowfalls are frequent, but snow cover generally

disappears during mild periods. In the foothill and mountain areas, snow cover is more persistent, and a deep snowpack accumulates at the higher elevations. Snow melt generally provides adequate water for agricultural purposes. In some years, winter blizzards with heavy snows, strong winds, and drifting snow strike the area.

In winter, the average temperatures are 28.4 and 24.0 degrees F, respectively, at Big Timber and Melville. The average daily minimum temperatures are 17.9 and 12.3 degrees F, respectively. The lowest temperatures on record were -47 degrees F at Big Timber on February 15, 1936, and -45 degrees F at Melville on February 3, 1989.

Growing-degree days, as shown in the "Temperature and Precipitation" table, are equivalent to heat units. During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation can be used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation over the survey area is generally between 15 and 18 inches. Over the higher elevation areas near the mountains in the northwest and the extreme south of the survey area, annual precipitation goes above 20 inches. At Big Timber, the average annual precipitation is 16.29 inches, and, at Melville, it is 17.60 inches. Of these amounts, about 10 inches, or around 60 percent of the average annual, generally falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfalls during the periods of record were 4.00 inches at Big Timber on May 19, 1938, and 2.93 inches at Melville on August 1, 1976. Thunderstorms occur on about 28 days each year, and most occur between late May and mid-August.

The average seasonal snowfall is somewhat dependent on elevation. At Big Timber, the average annual snowfall is 30.7 inches, while at Melville, nearly 1,300 feet higher, it is 44.7 inches. The greatest snow depths at any one time during the periods of record were 24 inches at Big Timber on December 26, 1996, and 22 inches at Melville on January 26, 1975. On average, about 20 days per year have at least 1 inch of snow on the ground at Big Timber and about 30 to 40 days are common at higher elevations. The heaviest 1-day snowfalls on record were 24.0 inches recorded on January 26, 1975, at Big Timber and 18.0 inches at Melville on April 4, 1997.

The average relative humidity in midafternoon is about 30 percent in the summer and about 55 percent in the winter. Humidity is higher at night, and the average at dawn is between 65 and 70 percent in all months. The sun shines about 72 percent of the time in summer and about 48 percent in winter. The prevailing wind is from the west or southwest. The average wind speed is highest, about 13 miles per hour, in December and January.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses.

Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Temperature and Precipitation

(Recorded in the period 1971 through 2000 at Big Timber and Melville)

	Temperature (Degrees F)					Precipitation (Inches)					
Month	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10		Average Number of Growing- degree Days*	Average	2 years in 10		Average Number of Days With 0.10 or More	Average Total Snowfall
				Will Have—				Will Have—			
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
BIG TIMBER:											
January----	36.8	16.0	26.4	60	-23	22	0.69	0.27	1.10	2	5.5
February----	42.1	19.4	30.8	64	-19	37	0.50	0.11	0.88	1	4.3
March-----	49.6	24.6	37.1	72	-11	84	0.93	0.46	1.32	3	4.6
April-----	59.0	31.6	45.3	82	11	200	1.83	0.64	2.99	5	2.1
May-----	68.2	39.5	53.9	89	25	431	2.87	1.63	3.88	6	0.2
June-----	78.0	47.4	62.7	97	33	668	2.60	1.14	3.81	5	0.0
July-----	86.2	52.2	69.2	101	40	891	1.54	0.55	2.39	3	0.0
August-----	85.5	50.9	68.2	99	37	855	1.25	0.38	2.14	3	0.1
September---	74.0	41.4	57.7	94	24	531	1.28	0.53	1.98	3	0.5
October-----	61.3	33.5	47.4	83	8	269	1.37	0.53	2.19	3	1.7
November----	45.2	24.6	34.9	69	-8	69	0.73	0.31	1.09	2	4.6
December----	38.0	18.2	28.1	60	-23	22	0.71	0.20	1.17	2	7.2
Yearly:											
Average---	60.3	33.3	46.8	—	—	—	—	—	—	—	—
Extreme---	104.0	-38.0	—	101	-28	—	—	—	—	—	—
Total-----	—	—	—	—	—	4,080	16.29	12.72	19.16	38	30.7
MELVILLE:											
January-----	34.0	10.9	22.5	58	-26	7	0.62	0.21	0.96	2	4.0
February-----	37.6	13.9	25.8	60	-26	9	0.50	0.17	0.80	2	5.5
March-----	42.7	19.2	31.0	65	-16	24	1.18	0.61	1.69	3	11.5
April-----	51.1	26.4	38.7	74	2	89	1.91	0.87	2.90	5	9.9
May-----	60.0	34.8	47.4	80	19	248	2.84	1.47	4.14	6	0.7
June-----	68.4	42.3	55.4	85	29	461	2.95	1.36	4.27	7	0.0
July-----	75.6	47.2	61.4	90	34	664	2.14	0.82	3.27	5	0.0
August-----	75.5	46.4	61.0	88	32	650	1.64	0.69	2.49	4	0.0
September---	65.8	38.2	52.0	86	18	375	1.39	0.48	2.31	3	1.9
October-----	55.6	29.6	42.6	77	1	168	1.13	0.48	1.72	3	1.2
November----	41.1	18.6	29.8	67	-14	32	0.75	0.30	1.11	2	4.5
December----	35.4	12.1	23.8	58	-28	8	0.56	0.20	0.89	2	5.5
Yearly:											
Average---	53.6	28.3	40.9	—	—	—	—	—	—	—	—
Extreme---	93.0	-45.0	—	90	-34	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,736	17.60	14.12	20.96	44	44.7

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Freeze Dates in Spring and Fall

(Recorded in the period 1971 through 2000 at Big Timber and Melville)

Probability	Temperature		
	24 Degrees F or Lower	28 Degrees F or Lower	32 Degrees F or Lower
BIG TIMBER:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 3	May 18	May 30
2 years in 10 later than----	April 28	May 13	May 26
5 years in 10 later than----	April 19	May 3	May 17
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 23	September 17	September 4
2 years in 10 earlier than--	September 28	September 21	September 9
5 years in 10 earlier than--	October 9	September 29	September 18
MELVILLE:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 20	June 3	June 29
2 years in 10 later than----	May 14	May 30	June 22
5 years in 10 later than----	May 5	May 21	June 10
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 15	September 5	August 24
2 years in 10 earlier than--	September 19	September 9	August 29
5 years in 10 earlier than--	September 28	September 18	September 8

Growing Season

(Recorded in the period 1971 through 2000 at Big Timber and Melville)

Probability	Daily Minimum Temperature		
	Higher Than 24 Degrees F	Higher Than 28 Degrees F	Higher Than 32 Degrees F
	<i>Days</i>	<i>Days</i>	<i>Days</i>
BIG TIMBER:			
9 years in 10-----	148	127	103
8 years in 10-----	156	134	110
5 years in 10-----	171	148	123
2 years in 10-----	187	161	136
1 year in 10-----	195	168	143
MELVILLE:			
9 years in 10-----	126	101	64
8 years in 10-----	133	107	73
5 years in 10-----	145	118	88
2 years in 10-----	157	130	104
1 year in 10-----	163	136	113

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," at the end of this section show the classification and extent of the soils in this survey area.

Formation of the Soils

Soil is a natural, three-dimensional body on the earth's surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, the physical and chemical composition of the parent material, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the Sweet Grass County Area.

Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. The Sweet Grass County Area has a subhumid to semiarid continental climate strongly influenced by close proximity to high-elevation mountains. The climate is characterized by wide seasonal variations in temperature and wide local variations in temperature and precipitation. The mean annual temperature ranges from 35 to 45 degrees F, and the average annual rainfall ranges from 14 to 25 inches in the survey area. The average growing season ranges from 50 to 125 days.

Climate indirectly affects soil formation through its effect on the kind and amount of living organisms on and in the soil. Vegetation and organisms decay to produce organic matter in the soil. Soils that have cool temperatures and high precipitation generally contain more organic matter and are dark colored. Soils that have warm temperatures and low precipitation generally contain less organic matter and are light colored.

Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

Living Organisms

Living organisms are active in the formation of soils. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure.

The kinds and amounts of living organisms are determined by soil-forming factors, such as climate and topography. On the plains of Sweet Grass County, grasses and forbs are the dominant vegetation. At higher elevations and on portions of the Yellowstone River breaks, coniferous trees with woody plants, forbs, and grass undergrowth are dominant.

Roots, rodents, and insects penetrate the soil and alter its structure. The deep, fibrous root system of grasses improves the porosity and structure of the soil. Because of this porosity, the activity of microbes, earthworms, and burrowing animals increases. Animals, in turn, increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Deep roots transport minerals and plant nutrients to the surface, thus improving fertility. Under coniferous trees, needles that drop to the soil surface increase the acidity of the soil.

Some organisms in the soil take in nitrogen from the air and incorporate it into plant tissues. After

these organisms die, the nitrogen is released in various forms and becomes available to plants.

Soils under forest plants tend to be cooler than soils under grassland plants. Wet soils have less oxygen available to microbes than drier soils. The activity of microorganisms and animals is less extensive in cooler, wetter soils. As a result, organic matter is broken down more slowly and more organic litter remains on the surface of the soil.

Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its effect on drainage and runoff. The degree of slope, shape of the land surface, and permeability of the soil determine the rate of runoff, internal drainage, and moisture content of the soil.

Relief features in Sweet Grass County have been determined by glaciation, geological uplift, volcanic action, and removal and deposition of materials by wind and water. The slopes in Sweet Grass County range from 1 percent on bottomlands and terraces to over 60 percent on mountainsides and breaks along drainageways.

The number and distinctness of soil horizons generally decrease as slope increases. Soils on steep slopes with rapid runoff have many characteristics similar to those of soils formed in arid climates. Soils on east- and north-facing slopes have cooler temperatures than those on west- and south-facing slopes. East- and north-facing slopes receive less sunlight. As a result, the soils on these slopes retain water longer and are cooler than soils on west- and south-facing slopes. The surface soil is darker and the depth to lime is generally deeper on north-facing slopes than on south-facing slopes. In some parts of the survey area, these differences are pronounced. Soils formed only on east- and north-facing slopes include Vision soils. These soils differ from the Winkler soils that formed in similar material on south-facing slopes.

The soil horizons on gently sloping surfaces are generally more distinct than soils formed in similar parent material on steep and very steep surfaces. Gently sloping soils absorb more moisture, and water is retained in the soil to a greater depth. Soils on steeper slopes generally have a thinner, lighter colored surface layer and a shallower depth to lime than soils formed on lesser slopes. Erosion caused

by the runoff on steeper soils also restricts the formation of distinct soil horizons.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It strongly affects the chemical and mineralogical composition of the soil. The soils in the Sweet Grass County Area formed in many different kinds of parent materials. The major materials are recent alluvium, glacial alluvium, mixed alluvium and colluvium, soft bedrock, hard bedrock, and volcanic mudflows.

Recent alluvium is water-deposited material on the bottomlands and low terraces along the major streams and rivers. These soils contain varying amounts of sand, silt, and clay. Many of them contain rounded gravel, cobbles, and stones. Soils formed on these positions lack significant soil development; they tend to be stratified. Many soils are still subject to flooding. Havre and Ledger soils formed in alluvium on bottomlands. Kobase and Korchea soils formed on low stream terraces.

Glacial alluvium is material deposited by glacial melt water. This material is on terraces and outwash plains throughout the county. The deposits range from Pleistocene to Miocene Ages. These soils contain varying amounts of sand, silt, and clay with large amounts of gravel and cobbles. The soils formed in these materials generally have good horizon development. Roy and Shawmut soils are examples of soils formed in these materials.

Mixed alluvium and colluvium have been deposited by the combined forces of gravity and water. They consist of materials that have been moved downslope from higher areas and redeposited on footslopes, alluvial fans, and along drainageways. They contain varying amounts of silt and clay with lesser amounts of sand. Soils formed in these materials show varying degrees of development, depending upon the other soil-forming factors. Shambo and Yamacall soils are examples of soils from these materials with slight horizon development. Farnuf and Work soils show good horizon development.

Material weathered from soft bedrock formations is a major parent material in the uplands in this survey area. Most of these materials are calcareous. The soils formed in place, or they formed in material that was locally reworked and transported by water and wind. These deposits range in thickness from a few inches to several feet over the underlying bedrock. Most soils formed in this material have weakly

expressed horizons. Cabba, Delpoint, Doney, and Yawdim soils formed in this material. Some soils, such as Marmarth and Tanna, show good profile development.

Material weathered from hard sandstone is another parent material for many upland soils. These deposits range from a few inches to a little over a foot in thickness. They formed in place and include large amounts of angular sandstone channers. Soils formed in this material typically have weakly expressed horizons. Castner and Reedpoint soils formed in this material.

Volcanic mudflows are extensive in the uplands south of the Yellowstone River. The material is of Cretaceous Age. These materials weathered in place or they formed in material locally reworked and redeposited by gravity, wind, and water. The deposits range in thickness from a few inches to several feet. The material is not calcareous and consists of varying amounts of silt and sand with lesser amounts of clay. Examples of soils formed in this material include the Ashbon, Sweetweed, and Weedzunit soils.

Time

Change taking place in soils over a long period is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of these horizons are called soil morphology. These layers are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Soils are classified according to their approximate age, from young to mature. Age, or maturity, of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Young soils show very little profile development. Havre soils are considered a young soil. They are on flood plains and are inundated by water at some times. The parent material has been in place for a short time. This soil has little accumulation of organic matter, and there has been no clay movement within the soil. The soil profile has thin strata of water lain material that has not been altered, and the soil is limy up to the surface.

The Shambo soil formed in parent material that is similar to the parent material of the Havre soil but is older. The soil material has been in place longer and time has had longer to on this soil. The surface layer is darker and thicker than the Havre soil, and lime has been leached out of the surface soil. This soil has very little subsoil development.

The Farnuf soil is an example of a mature soil. It has extensive alteration of the subsoil. Fine clay particles have moved out of the surface soil and have been deposited in the subsoil. Lime and soluble minerals have been leached out of the subsoil and are redeposited in a layer of increased lime content below the subsoil. The passage of time has affected a great deal of change in the original water lain parent material.

Many of the sloping and steep, shallow, and very shallow soils appear to have been in the process of formation for about as long as some of the more developed, less sloping soils. However, erosion has removed the soil as fast as it formed. In this case, the effect of time has been offset by the effect of relief.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Classification of the Soils," shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol, from *mollis*, meaning soft.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning burnt, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each

great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustoll (*Argi*, meaning having an argillic horizon or clay accumulation, plus *ustoll*, the suborder of the Mollisols that has a dry climate).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, frigid Typic Argiustolls.

SERIES. The series consists of soils within a family that have horizons similar in arrangement in the profile, color, consistence, mineral and chemical composition, reaction, structure, and texture. An example is the Farnuf series. The soils in the Farnuf series are fine-loamy, mixed, superactive, frigid Typic Argiustolls.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the

range of important characteristics of the soils in the series.

Absarokee Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Escarpment, hill, structural bench, terrace, and swale on plain

Parent material: Silty and clayey residuum weathered from sandstone and shale

Slope range: 0 to 45 percent

Elevation range: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 125 days

Taxonomic Class: Fine, smectitic, frigid Typic Argiustolls

Typical Pedon

Absarokee loam, in an area of Absarokee-Amherst complex, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet south and 1,700 feet east of the northwest corner of sec. 27, T. 2 S., R. 17 E.; USGS Reed Point topographic quadrangle (lat. 45°38'06" N.; long. 109°37'01" W.)

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; weak medium platy structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; neutral (pH 6.8); clear smooth boundary.

A2—4 to 8 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak fine and moderate very fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; few fine and common very fine pores; neutral (pH 6.6); clear smooth boundary.

Bt1—8 to 14 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine roots; common fine pores; common distinct brown (7.5YR 4/4) moist; clay films on faces of peds; neutral (pH 6.6); gradual wavy boundary.

Bt2—14 to 23 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and moderate fine subangular blocky structure; moderately hard,

friable, very sticky, very plastic; common very fine roots; common fine pores; common distinct strong brown (7.5YR 4/6) moist; clay films on faces of peds; neutral (pH 6.8); clear wavy boundary.

Bk—23 to 26 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; few fine pores; few fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

Cr—26 to 60 inches; interbedded semiconsolidated shale and hard sandstone; slightly effervescent.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 12 to 30 inches

Depth to the Cr horizon: 20 to 40 inches

A horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent stones and cobbles; 0 to 5 percent gravel or channers

Reaction: pH 6.6 to 8.4

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent stones and cobbles; 0 to 5 percent gravel or channers

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 25 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel or channers

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.4 to 9.0

Absher Family

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Very slow (less than 0.06 inch/hour)

Landform: Flood plain and stream terrace

Parent material: Silty and clayey alluvium

Slope range: 0 to 8 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 40 to 45 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Leptic Torrertic Natrustalfs

Typical Pedon

Absher clay (when mixed), in an area of Soapcreek-Absher family complex, 0 to 4 percent slopes, in an area of rangeland, 2,000 feet south and 1,200 feet east of the northwest corner of sec. 18, T. 4 N., R. 15 E.; USGS Melville topographic quadrangle (lat. 46°05'54" N.; long. 109°54'35" W.)

E—0 to .5 inch; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine and medium granular; moderately hard, friable, moderately sticky, moderately plastic; common very fine roots; common very fine pores; slightly effervescent; moderately alkaline (pH 8.4); abrupt broken boundary.

Bt_n—.5 to 4 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 4/2) moist; strong coarse columnar structure parting to moderate medium and coarse angular blocky; very hard,

firm, very sticky, very plastic; common very fine roots; common very fine pores; continuous distinct dark grayish brown (2.5Y 4/2) moist; clay films on faces of peds and lining pores; common discontinuous black (10YR 2/1), moist, organic coats on faces of peds and in pores; slightly effervescent; very strongly alkaline (pH 9.6); abrupt smooth boundary.

Btn2—4 to 9 inches; grayish brown (10YR 5/2) clay, dark gray (10YR 4/1) moist; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine pores; few distinct patchy dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and lining pores; strongly effervescent; very strongly alkaline (pH 9.6); clear smooth boundary.

Btkgnyz—9 to 19 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; moderate medium and coarse angular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; common very fine pores; few distinct patchy dark yellowish brown (10YR 3/4), moist; clay films on faces of peds and lining pores; many fine masses of lime; common fine crystals of gypsum and other salts; 3 percent gravel; strongly effervescent; strongly alkaline (pH 8.6); clear smooth boundary.

Bkgyz1—19 to 33 inches; olive gray (5Y 5/2) clay loam, olive gray (5Y 4/2) moist; common medium and coarse prominent light olive brown (2.5Y 5/6) moist, redox concentrations; weak coarse prismatic structure; very hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; many fine and medium masses of lime; common fine crystals of gypsum and other salts; 7 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bkgyz2—33 to 44 inches; light gray (5Y 7/2) gravelly sandy clay loam, olive gray (5Y 5/2) moist; common medium prominent light olive brown (2.5Y 5/6) moist, redox concentrations; massive; moderately hard, friable, moderately sticky, moderately plastic; many fine and medium masses of lime; few fine crystals of gypsum and other salts; 25 percent gravel; violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

BCKg—44 to 60 inches; light gray (5Y 7/1) gravelly sandy loam, olive gray (5Y 5/2) moist; massive; moderately hard, friable, slightly sticky, slightly

plastic; disseminated lime; 30 percent gravel; violently effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the seasonal high water table: 18 to 36 inches

Depth to the Btkgnyz horizon: 6 to 20 inches

E horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 1 to 3

Texture (less than 2 mm): Silty clay loam, loam, silt loam, or fine sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 1 to 5

Reaction: pH 6.6 to 8.4

Btn horizons

Hue: 2.5Y or 10YR

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 1 to 3

Texture (less than 2 mm): Clay, silty clay, or clay loam

Clay content: 35 to 60 percent

Structure: Moderate or strong columnar or prismatic

Consistence: Very hard or extremely hard when dry

Content of rock fragments: 0 to 15 percent gravel

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 18 to 50

Reaction: pH 6.6 to 9.6

Btkgnyz horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 20 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 32 mmhos/cm

Sodium adsorption ratio: 18 to 50

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.6

*Bkgyz horizons**Hue:* 10YR, 5Y, or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Clay loam, sandy clay loam, clay, or silty clay*Clay content:* 27 to 50 percent*Content of rock fragments:* 0 to 20 percent gravel*Calcium carbonate equivalent:* 5 to 15 percent*Electrical conductivity:* 8 to 32 mmhos/cm*Sodium adsorption ratio:* 18 to 50*Gypsum content:* 1 to 5 percent*Reaction:* pH 7.9 to 9.6*BCKg horizon**Hue:* 2.5Y or 5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 1 or 2*Texture (less than 2 mm):* Sandy clay loam, clay loam, or sandy loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 5 to 35 percent gravel*Calcium carbonate equivalent:* 5 to 15 percent*Electrical conductivity:* 8 to 32 mmhos/cm*Reaction:* pH 7.9 to 9.6**Absher Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Well drained*Permeability:* Very slow (less than 0.06 inch/hour)*Landform:* Plain and stream terrace*Parent material:* Silty and clayey alluvium*Slope range:* 0 to 8 percent*Elevation range:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Mean annual air temperature:* 40 to 45 degrees F*Frost-free period:* 95 to 125 days**Taxonomic Class:** Fine, smectitic, frigid Leptic
Torrtic Natrustalfs**Typical Pedon**

Absher silty clay (when mixed), 2,580 feet north and 2,520 feet east of the southwest corner of sec. 17, T. 19 N., R. 1 E.; Cascade County, Montana.

E—0 to 1 inch; light brownish gray (2.5Y 6/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate very thin platy structure parting to moderate very fine and fine granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores;

many unstained sand grains; neutral (pH 6.6); abrupt wavy boundary.

Btn1—1 to 5 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure; extremely hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; few medium and many very fine and fine pores; few faint uncoated sand grains on vertical faces of peds; continuous distinct clay films on faces of peds; slightly alkaline (pH 7.7); clear wavy boundary.

Btn2—5 to 11 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure parting to strong fine and medium angular blocky; extremely hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; continuous distinct clay films on faces of peds; slightly effervescent; moderately alkaline (pH 8.3); clear wavy boundary.

Btknyz—11 to 16 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium subangular blocky structure; extremely hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; continuous distinct clay films on faces of peds; few very fine masses of lime; common fine and medium crystals of gypsum and other salts; strongly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.

Bknyz—16 to 32 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, firm, moderately sticky, moderately plastic; many very fine and fine roots and pores; many medium and coarse crystals of gypsum and other salts; common fine threads of lime; disseminated lime; strongly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.

Bkyz1—32 to 42 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; few medium and many very fine and fine pores; common fine crystals of gypsum and other salts; few fine threads of lime; disseminated lime; slightly effervescent; strongly alkaline (pH 8.5); diffuse wavy boundary.

Bkyz2—42 to 60 inches; very pale brown (10YR 7/3) clay, grayish brown (2.5Y 5/2) and brown (10YR 5/3) moist; silt loam varves that are massive and average 1 centimeter in thickness; extremely hard, firm, moderately sticky, moderately plastic;

few very fine and fine roots; few very fine and fine crystals of gypsum and other salts; few fine threads of lime; disseminated lime; slightly effervescent; strongly alkaline (pH 8.5).

Range in Characteristics

Soil temperature: 42 to 47 degrees F (60 to 68 degrees F in summer)

Moisture control section: Between 4 and 12 inches

Depth to the Btknyz horizon: 6 to 20 inches

E horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam, silt loam, or fine sandy loam (Where mixed with the Bt horizon, textures are mainly silty clay loam, clay loam, silty clay, clay, silt loam, or sandy clay loam.)

Clay content: 15 to 55 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel

Electrical conductivity: 4 to 8 mmhos/cm

Reaction: pH 6.6 to 8.4

Btn horizons

Hue: 2.5Y, 7.5YR, or 10YR

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 1 to 3

Texture (less than 2 mm): Silty clay, clay, or clay loam

Clay content: 35 to 60 percent

Structure: Moderate or strong columnar or prismatic

Consistence: Very hard or extremely hard when dry

Content of rock fragments: 0 to 15 percent gravel

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 18 to 50

Reaction: pH 6.6 to 9.6

Btknyz horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 20 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 32 mmhos/cm

Sodium adsorption ratio: 18 to 50

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.6

Bknyz and Bkyz horizons

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, sandy clay loam, silty clay, clay, or silty clay loam

Clay content: 27 to 45 percent

Content of rock fragments: 0 to 20 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 32 mmhos/cm

Sodium adsorption ratio: 18 to 50

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.6

Adel Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Swale on fan, drainageway on mountain, fan on mountain, and swale on mountain

Parent material: Loamy alluvium or colluvium

Slope range: 2 to 45 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 35 to 44 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Pachic Haplocryolls

Typical Pedon

Adel loam, in an area of Adel-Timberlin complex, 8 to 35 percent slopes, in an area of deciduous forest, 400 feet south and 2,100 feet west of the northeast corner of sec. 13, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°34'53" N.; long. 110°03'41" W.)

A1—0 to 12 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; strong fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and many very fine and fine roots; many very fine and fine pores; 5 percent gravel; neutral (pH 6.6); clear smooth boundary.

A2—12 to 23 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; few coarse and common fine and medium roots; many very fine and fine pores; 5 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

A3—23 to 37 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few very fine and medium and common fine roots; many very fine and fine pores; 10 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bw1—37 to 48 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine to coarse roots; common medium and many very fine and fine pores; 5 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bw2—48 to 60 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine to coarse roots; common very fine to medium pores; 10 percent gravel; slightly acid (pH 6.4).

Range in Characteristics

Soil temperature: 36 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 16 to 60 inches

A1 horizon

Hue: 10YR or 2.5Y

Value: 2 to 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.1 to 7.3

A2 horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.1 to 7.8

A3 horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.1 to 7.8

Bw horizons

Hue: 2.5Y or 10YR

Value: 4 or 5 dry; 2 to 4 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.1 to 7.8

Albicalis Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Flood plain and drainageway on escarpment

Parent material: Fine-loamy alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 39 to 44 degrees F

Frost-free period: 85 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Aeric Fluvaquents

Albicalis soils as mapped in this survey area are taxadjunct to the series. They are outside the series range with higher reaction and calcium carbonate equivalent in the 10- to 20-inch calcareous and reaction class control section. Use and management are not significantly affected. Albicalis series classifies Fine-loamy, mixed, superactive, nonacid, frigid Aeric Fluvaquents.

Typical Pedon

Albicalis loam, in an area of Korchea-Fairway-Albicalis loams, channeled, 0 to 4 percent slopes, in an area of rangeland, 500 feet south and 300 feet west of the northeast corner of sec. 14, T. 4 N., R. 15 E.; USGS Upper Glasston Lake topographic quadrangle (lat. 46°06'10" N.; long. 109°48'48" W.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist;

moderate fine granular structure; soft, very friable, slightly sticky, nonplastic; common fine to coarse and many very fine roots; many very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

Cg1—4 to 14 inches; grayish brown (2.5Y 5/2) stratified loam and very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct strong brown (7.5YR 4/6) moist, redox concentrations; massive; soft, very friable, slightly sticky, nonplastic; common fine to coarse roots; many very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cg2—14 to 42 inches; light brownish gray (2.5Y 6/2) stratified loam, dark grayish brown (2.5Y 4/2) moist; common fine and medium distinct brown (7.5YR 4/4) moist, redox concentrations; massive; soft, very friable, slightly sticky, nonplastic; few medium and common very fine and fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); diffuse smooth boundary.

Cg3—42 to 52 inches; light brownish gray (2.5Y 6/2) stratified loam and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine faint strong brown (7.5YR 4/6) moist, redox concentrations; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cg4—52 to 60 inches; gray (5Y 6/1) stratified loam, dark gray (5Y 4/1) moist; common fine and medium distinct strong brown (7.5YR 4/6) moist, redox concentrations; massive; soft, very friable, slightly sticky, slightly plastic; slightly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the seasonal high water table: 12 to 24 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

Cg1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Redox concentrations: Common or many; chroma of 4 or 6

Texture (less than 2 mm): Loam or clay loam with strata of silt loam, very fine sandy loam, loamy sand, or loam

Clay content: 18 to 35 percent, mixed

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

Cg2 and Cg3 horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Redox concentrations: Common or many; chroma of 4 or 6

Texture (less than 2 mm): Loam, silt loam, or clay loam with strata of silt loam, fine sandy loam, loam, or clay

Clay content: 18 to 35 percent, mixed

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

Cg4 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 1 or 2

Redox concentrations: None to many; chroma of 4, 6, or 8

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Loam or silty clay loam with strata of silt loam, clay loam, and fine sandy loam

Clay content: 18 to 35 percent, mixed

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

Amherst Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Escarpment, hill, structural bench, and knoll on plain

Parent material: Clayey residuum weathered from sandstone or andesite

Slope range: 2 to 45 percent
Elevation range: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 40 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Clayey, smectitic, frigid Lithic Argiustolls

Typical Pedon

Amherst gravelly clay loam, in an area of Castner-Amherst complex, 2 to 15 percent slopes, in an area of rangeland, 1,400 feet south and 1,700 feet west of the northeast corner of sec. 26, T. 1 N., R. 12 E.; USGS Kelly Hills topographic quadrangle (lat. 45°48'37" N.; long. 110°11'41" W.)

A—0 to 4 inches; brown (10YR 4/3) gravelly clay loam; very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, moderately sticky, moderately plastic; common very fine to medium roots; many very fine and fine pores; 20 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt1—4 to 12 inches; brown (10YR 4/3) clay loam; dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; moderately hard, friable, very sticky, very plastic; few fine and medium and common very fine roots; few fine and common very fine pores; common faint dark yellowish brown (10YR 3/4) moist; clay films on faces of pedis; 5 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt2—12 to 18 inches; brown (10YR 5/3) gravelly clay loam; brown (10YR 4/3) moist; moderate medium subangular blocky structure; moderately hard, friable, very sticky, very plastic; few very fine roots; common very fine pores; common faint dark yellowish brown (10YR 3/4) moist; clay films on faces of pedis; 15 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

R—18 inches; hard fractured noncalcareous sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 12 inches
Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam

Clay content: 27 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel or channers
Reaction: pH 6.6 to 7.8

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam or loam
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel or channers
Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel or channers
Reaction: pH 6.6 to 7.8

Amor Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment, hill, and swale on plain
Parent material: Loamy residuum weathered from sandstone and siltstone
Slope range: 2 to 35 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 40 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Amor loam, in an area of Amor-Cabba loams, 2 to 8 percent slopes, in an area of rangeland, 2,000 feet north and 2,400 feet east of the southwest corner of sec. 22, T. 4 N., R. 13 E.; USGS Battleship Butte quadrangle (lat. 46°04'51" N.; long. 110°05'35" W.)

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft,

very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.0); clear smooth boundary.

A2—4 to 7 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to weak very fine granular; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); clear smooth boundary.

Bw—7 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine pores; very slightly effervescent; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bk1—12 to 22 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; common fine soft masses of lime; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk2—22 to 30 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; common fine and medium soft masses of lime; 5 percent channers; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

BCK—30 to 34 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; common fine and medium soft masses of lime; 5 percent soft siltstone chips; 10 percent channers; violently effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

Cr—34 to 60 inches; soft interbedded sandstone and siltstone bedrock; few very fine roots in cracks; strongly effervescent.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 20 inches

Depth to the Cr horizon: 20 to 40 inches

A horizons

Hue: 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, sandy clay loam, or fine sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.6 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, fine sandy loam, or silt loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

BCK horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, fine sandy loam, or silt loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent gravel or channers

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Arrowpeak Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Mountain

Parent material: Residuum weathered from sandstone or gabbro

Slope range: 2 to 60 percent

Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 38 to 42 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryolls

Typical Pedon

Arrowpeak very cobbly loam, in an area of Millerlake-Arrowpeak-Adel complex, 8 to 35 percent slopes, in an area of rangeland, 800 feet south and 900 feet west of the northeast corner of sec. 21, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°54'46" N.; long. 110°14'01" W.)

A—0 to 6 inches; brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly sticky, slightly plastic; few medium, common fine, and many very fine roots; common fine and many very fine pores; 15 percent gravel; 25 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bw—6 to 14 inches; brown (10YR 4/3) extremely cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; common fine and medium and many very fine pores; 25 percent gravel; 35 percent cobbles; neutral (pH 6.6); abrupt wavy boundary.

R—14 inches; hard fractured igneous bedrock.

Range in Characteristics

Soil temperature: 40 to 44 degrees F
Moisture control section: Between 8 inches and bedrock

Thickness of the mollic epipedon: 7 to 20 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 20 to 25 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 50 to 80 percent—0 to 5 percent stones; 35 to 45 percent cobbles; 15 to 30 percent gravel or channers

Reaction: pH 6.1 to 7.3

Ashbon Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Hill

Parent material: Residuum weathered from tuff breccia

Slope range: 8 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 40 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, nonacid, frigid Lithic Ustorthents

Typical Pedon

Ashbon very gravelly sandy loam, in an area of Ashbon-Winkler-Rock outcrop complex, 35 to 60 percent slopes, in an area of coniferous forest, 450 feet south and 250 feet west of the northeast corner of sec. 9, T. 2 S., R. 15 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°40'50" N.; long. 109°52'16" W.)

Oi—0 to 1 inch; slightly decomposed needles, twigs, and leaves.

A—1 to 6 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; 35 percent gravel; 3 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

C—6 to 16 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; common fine pores; 50 percent gravel; 5 percent cobbles; moderately acid (pH 6.0); abrupt smooth boundary.

R—16 inches; volcanic mudflow breccia bedrock.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 inches and the lithic contact

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent cobbles; 15 to 55 percent gravel

Reaction: pH 6.1 to 7.3

C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist;

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam or loam

Clay content: 5 to 25 percent

Content of rock fragments: 50 to 80 percent—0 to 15 percent cobbles; 50 to 65 percent gravel

Reaction: pH 5.6 to 7.3

Attewan Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 21 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Stream terrace and terrace

Parent material: Loamy over sandy and gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 38 to 45 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Attewan loam, in an area of Attewan loam, 0 to 4 percent slopes, in an area of rangeland, 2,150 feet north and 1,450 feet east of the southwest corner of sec. 36, T. 1 N., R. 15 E.; USGS Greycliff topographic quadrangle (lat. 45°47'29" N.; long. 109°48'31" W.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak

fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, nonplastic; few fine and common very fine roots; common very fine and fine pores; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bt—4 to 12 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and moderate very fine subangular blocky structure; very hard, friable, moderately sticky, moderately plastic; common very fine roots; common fine pores; common distinct discontinuous very dark brown (10YR 2/2), moist; clay films on faces of peds; slightly alkaline (pH 7.8); clear smooth boundary.

Bk—12 to 21 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine prismatic structure parting to weak fine and medium subangular blocky; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; common fine pores; disseminated lime; few fine and medium soft masses of lime; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

2BCK—21 to 60 inches; grayish brown (2.5Y 5/2) very gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many medium and coarse pores; common discontinuous carbonate coats on rock fragments; 40 percent gravel; 10 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 10 to 21 inches

Depth to the 2BCK horizon: 20 to 40 inches

Note: Some pedons have a Bk2 horizon.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 50 percent—0 to 20 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.1 to 7.8

Bt horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones and cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, sandy clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent stones and cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2BCK horizon

Hue: 10YR or 2.5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand, sand, loamy coarse sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent stones and cobbles; 35 to 60 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bacbuster Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Escarpment, hill, terrace, and swale on plain

Parent material: Clayey residuum weathered from sandstone and shale

Slope range: 2 to 35 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 38 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Argiustolls

Typical Pedon

Bacbuster clay loam, in an area of Bacbuster-Castner complex, 2 to 8 percent slopes, in an area of rangeland, 400 feet north and 500 feet east of the southwest corner of sec. 28, T. 3 N., R. 13 E.; USGS Grosfield Ranch topographic quadrangle (lat. 45°58'30" N.; long. 110°07'19" W.)

A—0 to 5 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); abrupt smooth boundary.

Bt1—5 to 9 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; continuous distinct dark brown (7.5YR 3/4) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—9 to 14 inches; yellowish brown (10YR 5/4) clay, brown (10YR 4/3) moist; strong coarse angular blocky structure parting to strong fine and medium subangular blocky; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; continuous distinct brown (7.5YR 4/4) moist; clay films on faces of peds and lining pores; 5 percent gravel; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bk—14 to 27 inches; light brownish gray (10YR 6/2) gravelly clay loam, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; common fine soft masses of lime; 20 percent soft shale chips; 15 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—27 to 60 inches; semiconsolidated calcareous shale; few carbonate coats on shale fragments.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 11 to 24 inches

Depth to the Cr horizon: 20 to 40 inches

Note: Some pedons have a Btk horizon.

A horizon

Hue: 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.6 to 7.8

Bt1 horizon

Hue: 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay, clay loam, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel; 0 to 15 percent soft shale chips

Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 10YR or 7.5YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, clay loam, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel; 0 to 25 percent soft shale chips

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 2.5Y or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or silty clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel; 0 to 60 percent soft shale chips

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

Bearmouth Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 25 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Stream terrace

Parent material: Sandy and gravelly alluvium

Slope range: 0 to 8 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 45 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Sandy-skeletal, mixed, Pachic Haplocryolls

Bearmouth soils as mapped in this survey area are taxadjunct to the series. They are outside the series range with a mollic epipedon that is 16-inches or more thick and has a texture finer than loamy fine sand. Use and management are not significantly affected. Bearmouth series classifies Sandy-skeletal, mixed Ustic Haplocryolls.

Typical Pedon

Bearmouth gravelly sandy loam, in an area of Bearmouth-Tiban-Beehive complex, 0 to 8 percent slopes, in an area of deciduous forest, 800 feet south and 2,300 feet east of the northwest corner of sec. 25, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°33'06" N.; long. 110°03'52" W.)

A—0 to 5 inches; very dark gray (10YR 3/1) gravelly sandy loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; many very fine and fine pores; 15 percent gravel; 5 percent cobbles; neutral (pH 7.2); clear wavy boundary.

Bw—5 to 25 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and medium and many very fine roots; many very fine and fine pores; 25 percent gravel; 10 percent cobbles; slightly alkaline (pH 7.4); clear wavy boundary.

2C—25 to 60 inches; grayish brown (10YR 5/2) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) dry; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 45 percent gravel; 20 percent cobbles; slightly effervescent; slightly alkaline (pH 7.8).

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 16 to 30 inches

Depth to the 2C horizon: 16 to 25 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Sandy loam or loam

Clay content: 10 to 25 percent

Content of rock fragments: 10 to 80 percent—0 to 5 percent stones; 5 to 35 percent cobbles; 5 to 40 percent gravel

Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 20 to 30 percent gravel

Reaction: pH 6.6 to 7.8

2C horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 60 to 90 percent—0 to 10 percent stones; 20 to 35 percent cobbles; 40 to 45 percent gravel

Reaction: pH 6.6 to 7.8

Beaverell Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 12 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Stream terrace and terrace

Parent material: Gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 38 to 45 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal over sandy or sandy skeletal, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Beaverell very gravelly loam, in an area of Attewan-Beaverell very gravelly loam, 0 to 4 percent slopes, 50 feet north and 1,000 feet east of the southwest corner of sec. 27, T. 2 S., R. 23 E.; Stillwater County, Montana.

A—0 to 6 inches; grayish brown (10YR 5/2) very gravelly loam; very dark grayish brown (10YR 3/2) moist; massive, soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 5 percent cobbles; 55 percent gravel; neutral (pH 7.2); gradual wavy boundary.

Bt—6 to 12 inches; brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common faint clay films on faces of peds and rock fragments; 5 percent cobbles; 55 percent gravel; neutral (pH 7.2); gradual wavy boundary.

2Bk—12 to 60 inches; brown (10YR 5/3) very gravelly sand, dark brown (10YR 4/3) moist; single grain; loose, soft, very friable; 10 percent cobbles; 60 percent gravel; common faint carbonate coats on undersides of gravel; disseminated lime; strongly effervescent; moderately alkaline (pH 7.9).

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 14 inches; may include all or part of the argillic horizon

Depth to the 2Bk horizon: 10 to 20 inches

Note: Some pedons have a 2C horizon.

A horizon

Value: 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 70 percent—0 to 40 percent stones and cobbles; 5 to 40 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 10YR or 7.5YR

Value: 3 to 5 dry; 2 to 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 15 percent cobbles; 35 to 55 percent gravel

Reaction: pH 6.6 to 7.8

2Bk horizon

Hue: 10YR or 2.5Y

Value: 4 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand, sand, or sandy loam

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—5 to 40 percent stones and cobbles; 30 to 60 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Beaverton Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 20 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Fan, stream terrace, and terrace

Parent material: Gravelly glaciofluvial deposits

Slope range: 0 to 4 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Loamy-skeletal over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Beaverton gravelly sandy clay loam, in an area of Beaverton gravelly sandy clay loam, 0 to 4 percent slopes, in an area of rangeland, 1,900 feet south and 1,400 feet west of the northeast corner of sec. 34, T. 5 N., R. 13 E.; USGS Porcupine Butte topographic quadrangle (lat. 46°08'32" N.; long. 110°04'34" W.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many

very fine and fine pores; 25 percent gravel; 5 percent cobbles; slightly alkaline (pH 7.6); gradual smooth boundary.

Bt1—5 to 11 inches; brown (10YR 4/3) very gravelly clay loam, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine to medium pores; distinct discontinuous brown (7.5YR 4/4) moist; clay films on faces of peds and rock fragments; 30 percent gravel; 10 percent cobbles; neutral (7.2); gradual wavy boundary.

Bt2—11 to 19 inches; brown (7.5YR 5/3) very gravelly loam, brown (7.5YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and medium roots; faint patchy strong brown (7.5YR 4/6) moist; clay films on faces of peds and rock fragments; 40 percent gravel; 10 percent cobbles; neutral (7.2); clear smooth boundary.

2Bk1—19 to 34 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few fine and medium roots; few carbonate coats on undersides of rock fragments; 45 percent gravel; 10 percent cobbles; 2 percent stones; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

2Bk2—34 to 60 inches; yellowish brown (10YR 5/4) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, nonplastic; common carbonate coats on undersides of rock fragments; 50 percent gravel; 15 percent cobbles; 5 percent stones; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 14 inches

Depth to the 2Bk horizon: 11 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy clay loam or loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 60 percent—0 to 25 percent cobbles; 5 to 40 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizons*Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 4 or 5 dry; 3 or 4 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, sandy clay loam, or loam*Clay content:* 25 to 35 percent*Content of rock fragments:* 35 to 60 percent—0 to 5 percent stones; 5 to 10 percent cobbles; 30 to 45 percent gravel*Reaction:* pH 6.6 to 7.8**2Bk1 horizon***Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist;*Chroma:* 2 to 4*Texture (less than 2 mm):* Loamy sand, loamy coarse sand, or sand*Clay content:* 0 to 10 percent*Content of rock fragments:* 35 to 80 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 30 to 55 percent gravel*Calcium carbonate equivalent:* 5 to 15 percent*Reaction:* pH 7.4 to 8.4**2Bk2 horizon***Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 5 or 6 dry; 4 to 6 moist;*Chroma:* 2 to 4*Texture (less than 2 mm):* Loamy sand, loamy coarse sand, or sand*Clay content:* 0 to 10 percent*Content of rock fragments:* 35 to 80 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 30 to 55 percent gravel*Calcium carbonate equivalent:* 3 to 12 percent*Reaction:* pH 7.4 to 8.4**Beehive Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Somewhat poorly drained*Permeability:* Rapid (6 to 20 inches/hour)*Landform:* Flood plain*Parent material:* Sandy and gravelly alluvium*Slope range:* 0 to 8 percent*Elevation range:* 5,500 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Mean annual air temperature:* 36 to 39 degrees F*Frost-free period:* 50 to 70 days**Taxonomic Class:** Sandy-skeletal, mixed Oxyaquic Cryofluvents**Typical Pedon**

Beehive gravelly sandy loam, in an area of Bearmouth-Tiban-Beehive complex, 0 to 8 percent slopes, in an area of deciduous forest, 1,350 feet south and 2,000 feet west of the northeast corner of sec. 25, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°33'01" N.; long. 110°03'38" W.)

Oi—0 to 2 inches; slightly decomposed leaves and twigs.

A—2 to 10 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; 20 percent gravel; 10 percent cobbles; neutral (pH 7.2); clear smooth boundary.

C1—10 to 26 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 35 percent gravel; 15 percent cobbles; slightly effervescent; slightly alkaline (pH 7.6); clear wavy boundary.

C2—26 to 62 inches; light brownish gray (10YR 6/2) extremely cobbly sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 35 percent gravel; 25 percent cobbles; 5 percent stones; slightly effervescent; slightly alkaline (pH 7.8).

Range in Characteristics*Soil temperature:* 36 to 40 degrees F*Moisture control section:* Between 12 and 35 inches*Depth to the seasonal high water table:* 24 to 42 inches**A horizon***Hue:* 10YR or 2.5Y*Value:* 4 or 5 dry; 3 or 4 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Sandy loam*Clay content:* 10 to 20 percent*Content of rock fragments:* 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent gravel*Reaction:* pH 6.1 to 7.8**C1 horizon***Hue:* 10YR or variegated*Value:* 4 or 5 dry; 3 or 4 moist*Chroma:* 2 to 4

Texture (less than 2 mm): Loamy coarse sand, loamy sand, or sandy loam

Clay content: 5 to 20 percent

Content of rock fragments: 40 to 70 percent—10 to 20 percent cobbles; 30 to 50 percent gravel

Reaction: pH 6.1 to 7.8

C2 horizon

Hue: 10YR or variegated

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy coarse sand, loamy sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 50 to 80 percent—0 to 5 percent stones; 25 to 35 percent cobbles; 20 to 40 percent gravel

Reaction: pH 6.6 to 7.8

Beenom Taxadjunct

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, structural bench, and knoll on plain

Parent material: Residuum weathered from sandstone or andesite

Slope range: 2 to 15 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 38 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy, mixed, superactive, frigid Lithic Argiustolls

Beenom soils as mapped in this survey area are taxadjunct to the series. They are outside the series range with annual precipitation ranging up to 20 inches. They are not dry in all parts of the 4- to 12-inch moisture control section for four-tenths or more of the cumulative days per year when the soil temperature at a depth of 20 inches below the soil surface is higher than 5 degrees C in normal years. As mapped in map units 371D, 371E, 372D, 372E, 394D, 395E, and 411E, the Beenom soils are outside the series concept with andesite parent material. Use and management are not significantly affected. Beenom series classifies Loamy, mixed, superactive, frigid Aridic Lithic Argiustolls.

Typical Pedon

Beenom gravelly loam, in an area of Whitlash-Beenom complex, 4 to 15 percent slopes, in an area of rangeland, 1,300 feet south and 2,200 feet west of the northeast corner of sec. 13, T. 1 N., R. 12 E.; USGS Kelly Hills topographic quadrangle (lat. 45°50'21" N.; long. 110°10'33" W.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine and fine pores; 20 percent gravel; neutral (pH 6.6); clear smooth boundary.

Bt1—6 to 13 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3), moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; distinct patchy dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; 10 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt2—13 to 17 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common fine pores; distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; 15 percent gravel; 10 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.

R—17 inches; hard sandstone.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.6 to 7.8

Bt1 horizon*Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 3 to 5 dry; 2 to 4 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, loam, or sandy clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 15 percent gravel*Reaction:* pH 7.4 to 8.4**Bt2 horizon***Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 4 or 5 dry; 3 or 4 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Clay loam, loam, or sandy clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel*Reaction:* pH 7.4 to 8.4**Bigsgag Family***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Very poorly drained*Permeability:* Very slow (less than 0.06 inch/hour)*Landform:* Flood plain, depression on flood plain, pothole on landslide, swale on landslide, and depression on plain*Parent material:* Clayey alluvium or colluvium weathered from sandstone and shale*Slope range:* 0 to 4 percent*Elevation range:* 3,750 to 6,200 feet*Mean annual precipitation:* 10 to 20 inches*Mean annual air temperature:* 39 to 46 degrees F*Frost-free period:* 70 to 125 days**Taxonomic Class:** Fine, smectitic, calcareous, frigid
Typic Halaquepts**Typical Pedon**

Bigsgag clay, in an area of Work-Roy, bouldery-Bigsag family complex, 2 to 35 percent slopes, in an area of rangeland, 1,000 feet north and 2,100 feet east of the southwest corner of sec. 14, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°34'12" N.; long. 110°12'31" W.)

A—0 to 4 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; very hard, friable, very sticky, very plastic; many very fine and fine roots; many very fine and fine pores; slightly

effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bzg1—4 to 21 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; common fine distinct strong brown (7.5YR 4/6) moist, redox concentrations; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine and medium roots; common very fine and fine pores; common fine soft masses of salt; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bzg2—21 to 31 inches; gray (5Y 6/1) clay, gray (5Y 5/1), moist; many fine and coarse prominent strong brown (7.5YR 4/6) moist, redox concentrations; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine and medium roots; common very fine and fine pores; common fine and medium soft masses of salt; slightly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bkzg1—31 to 48 inches; gray (5Y 6/1) clay, gray (5Y 5/1) moist; many medium and coarse prominent strong brown (7.5YR 4/6) moist, redox concentrations; strong medium and coarse angular blocky structure; very hard, firm, very sticky, very plastic; common fine and medium roots; few very fine pores; few soft masses of lime; many medium and coarse soft masses of salt; 10 percent gravel; strongly effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

Bkzg2—48 to 60 inches; gray (5Y 6/1) gravelly clay, gray (5Y 5/1) moist; many medium and coarse prominent strong brown (7.5YR 4/6) moist, redox concentrations; moderate medium and coarse angular blocky structure; very hard, firm, very sticky, very plastic; few soft masses of lime; many medium and coarse soft masses of salt; 20 percent gravel; strongly effervescent; strongly alkaline (pH 8.6).

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 to 12 inches*Depth to the seasonal high water table:* Ponded to 12 inches**A horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 3 or 4 moist*Chroma:* 1 or 2*Texture (less than 2 mm):* Clay

Clay content: 40 to 50 percent
Content of rock fragments: 0 to 15 percent gravel
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 4 to 13
Reaction: pH 6.6 to 7.8

Bzg horizons

Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Redox concentrations: Few to many; chroma of 6
Texture (less than 2 mm): Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 15 percent gravel
Electrical conductivity: 8 to 30 mmhos/cm
Sodium adsorption ratio: 4 to 13
Reaction: pH 7.4 to 8.4

Bkzg horizons

Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Redox concentrations: Few to many; chroma of 6
Texture (less than 2 mm): Clay or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 25 percent gravel
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 4 to 13
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Birney Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment
Parent material: Gravelly colluvium
Slope range: 15 to 60 percent
Elevation range: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Aridic Haplustepts

Typical Pedon

Birney channery loam, in area of Birney-Yawdim-Rock outcrop association, steep, 300 feet south and 500 feet west of the northeast corner of the southeast quarter of sec. 25, T. 2 S., R. 21 E.; Stillwater County, Montana.

A—0 to 4 inches; brown (10YR 5/3) channery loam, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; 20 percent hard shale and sandstone channers; slightly effervescent; moderately alkaline (pH 7.9), clear smooth boundary.

Bw—4 to 14 inches; yellowish brown (10YR 5/4) very channery loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; soft, very friable, slightly sticky, slightly plastic; many very fine roots; common very fine tubular pores; 40 percent hard shale and sandstone channers; slightly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk1—14 to 24 inches; pale brown (10YR 6/3) very channery sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky, nonplastic; common very fine and fine roots matted around rock fragments; common or many carbonate coats on undersides of rock fragments; 50 percent hard shale and sandstone channers; violently effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.

Bk2—24 to 60 inches; pale brown (10YR 6/3) very channery sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky, nonplastic; few fine roots; common or many carbonate coats on undersides of rock fragments; 60 percent hard shale and sandstone channers; moderately effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Depth to the Bk horizon: 10 to 15 inches
Note: Some pedons have a C horizon.

A horizon

Hue: 10YR
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam
Clay content: 10 to 25 percent
Content of rock fragments: 0 to 35 percent channers
Calcium carbonate equivalent: 1 to 10 percent
Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR
Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 0 to 40 percent gravel or channers

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Loam, sandy loam, or fine sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent flagstones; 35 to 60 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

Blacksheep Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Escarpment, hill, and knoll on plain

Parent material: Sandy residuum weathered from calcareous sandstone

Slope range: 2 to 25 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

Typical Pedon

Blacksheep fine sandy loam, in an area of Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes, 500 feet north and 1,200 feet east of the southwest corner of sec. 32, T. 2 N., R. 46 E.; Custer County, Montana.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine tubular pores; slightly alkaline (pH 7.4); clear smooth boundary.

Bk—6 to 16 inches; light gray (2.5Y 7/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist;

weak medium prismatic structure parting to weak fine subangular blocky; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; few fine and common very fine tubular pores; few medium masses of lime; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—16 to 60 inches; light gray (10YR 7/2) semiconsolidated sandstone; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 inches and the paralithic contact

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 2.5Y or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 2.5Y, 7.5YR, or 10YR

Value: 5 to 7 dry; 5 or 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam, very fine sandy loam, or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

Blossberg Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: In the upper 0 to 26 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Stream terrace

Parent material: Loamy over sandy and gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 37 to 45 degrees F

Frost-free period: 115 to 125 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiaquolls

The Blossberg soils as mapped in map unit 296B are a taxadjunct to the series. They are outside the series range with an argillic horizon; irrigation-induced episaturation; the profile is not gleyed below the Btg horizon in the Bt, BC, and 2C horizons; and these soils have greater than 15 percent rock fragments in the A horizon and on the surface. Blossberg series classifies as Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Endoaquolls.

Typical Pedon

Blossberg cobbly loam, in an area of Blossberg cobbly loam, 0 to 4 percent slopes, in an area of rangeland, 400 feet north and 2,200 feet east of the southwest corner of sec. 26, T. 1 N., R. 14 E.; USGS Big Timber topographic quadrangle (lat. 45°48'03" N.; long. 109°57'01" W.)

Oi—0 to 2 inches; partially decomposed organic matter.

A—2 to 8 inches; dark gray (10YR 4/1) cobbly loam, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine to medium roots; common fine and medium pores; common medium prominent reddish yellow (7.5YR 6/8) iron concentrations; 18 percent cobbles; 3 percent gravel; slightly alkaline (pH 7.5); abrupt smooth boundary.

Btg—8 to 13 inches; brown (7.5YR 5/2) sandy clay loam, brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; common medium and many very fine and fine roots; many fine and medium pores; few prominent dark brown (7.5YR 3/2) and brown (7.5YR 4/2) clay films on faces of peds and in pores; many medium prominent strong brown (7.5YR 5/8) iron concentrations; 5 percent cobbles; 5 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

Bt—13 to 19 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common medium and many very fine and fine roots; many fine and medium pores; few prominent brown (7.5YR 4/2) clay films on faces of peds and in pores; many medium prominent strong brown

(7.5YR 5/8) iron concentrations; 3 percent cobbles; 4 percent gravel; slightly alkaline (pH 7.7); clear smooth boundary.

BC—19 to 26 inches; brown (10YR 5/3) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, firm, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many fine and medium pores; common medium distinct strong brown (7.5YR 5/8) iron concentrations; 20 percent gravel; 5 percent cobbles; moderately alkaline (pH 8.1); abrupt smooth boundary.

2C1—26 to 49 inches; pale brown (10YR 6/3) extremely cobbly coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; common fine and medium roots; strongly effervescent; 40 percent gravel; 25 percent cobbles; 5 percent stones; moderately alkaline (pH 8.2); gradual smooth boundary.

2C2—49 to 60 inches; pale brown (10YR 6/3) extremely gravelly coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; common fine and medium roots; strongly effervescent; 55 percent gravel; 15 percent cobbles; moderately alkaline (pH 8.2).

Range in Characteristics:

Soil temperature: 39 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 11 to 14 inches

Depth to the Bt horizon: 6 inches

Depth to the 2C horizon: 22 to 24 inches

Depth to seasonal high water table: 0 to 12 inches from June to August

A horizon

Hue: 10YR

Value: 4 dry; 2 or 3 moist

Chroma: 1 dry; 2 or 3 moist

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 18 to 30 percent—
15 to 20 percent cobbles; 3 to 10 percent gravel

Reaction: pH 7.4 to 7.8

Btg horizon

Hue: 10YR or 7.5YR

Value: 5 dry; 4 moist

Chroma: 2

Texture (less than 2 mm): Sandy clay loam or clay loam

Clay content: 30 to 35 percent

Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel
Reaction: pH 7.4 to 7.8

Bt horizon

Hue: 10YR or 7.5YR
Value: 5 dry; 4 moist
Chroma: 4
Texture (less than 2 mm): Sandy clay loam, clay loam, or sandy clay
Clay content: 30 to 37 percent
Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel
Reaction: pH 7.4 to 7.8

BC horizon

Hue: 10YR
Value: 5 dry; 4 or 5 moist
Chroma: 3 dry; 2 to 4 moist
Texture (less than 2 mm): Sandy loam or loam
Clay content: 13 to 20 percent
Content of rock fragments: 10 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent gravel
Reaction: pH 7.4 to 8.2

2C horizons

Hue: 10YR
Value: 6 dry; 5 or 6 moist
Chroma: 3 dry; 2 to 4 moist
Texture (less than 2 mm): Coarse sand
Clay content: 2 to 5 percent
Content of rock fragments: 45 to 80 percent—5 to 25 percent stones and cobbles; 40 to 55 percent gravel
Reaction: pH 7.9 to 8.4

Bonebasin Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Very poorly drained
Permeability: In the upper 0 to 21 inches = moderately slow (0.2 to 0.6 inch/hour); below this depth = rapid (6 to 20 inches/hour)
Landform: Flood plain
Parent material: Gravelly alluvium
Slope range: 2 to 4 percent
Elevation range: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Mean annual air temperature: 39 to 42 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Fluvaquentic Endoaquolls

Typical Pedon

Bonebasin loam, in an area of Bowery-Nesda-Bonebasin complex, 2 to 15 percent slopes, in an area of rangeland, 2,300 feet south and 400 feet east of the northwest corner of sec. 26, T. 2 S., R. 13 E.; USGS McLeod topographic quadrangle (lat. 45°38'03" N.; long. 110°05'37" W.)

Oi—0 to 1 inch; partially decomposed organic matter.

A—1 to 4 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; few fine and medium faint dark yellowish brown (10YR 5/6) moist, redox concentrations; moderate very fine and fine granular structure; soft, friable, nonsticky, nonplastic; many very fine to medium roots; common very fine and fine pores; 5 percent gravel; slightly alkaline (pH 7.6); clear wavy boundary.

Ag—4 to 15 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; common fine and medium distinct yellowish brown (10YR 5/6) moist, redox concentrations; weak medium subangular blocky structure parting to moderate fine granular; soft, friable, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine pores; 5 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Cg—15 to 23 inches; gray (2.5Y 6/1) gravelly sandy loam, very dark gray (2.5Y 4/1) moist; common fine and medium distinct light olive brown (2.5Y 5/6) moist, redox concentrations; few faint very dark gray (5Y 3/1) moist, redox depletions; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine pores; thin strata of loam; 25 percent gravel; neutral (pH 7.0); clear wavy boundary.

2C—23 to 61 inches; gray (2.5Y 5/1) extremely gravelly loamy sand, dark gray (2.5Y 4/1) moist; few fine and medium distinct light olive brown (2.5Y 5/6) moist, redox concentrations; single grain; loose, nonsticky, nonplastic; 10 percent cobbles; 50 percent gravel; neutral (pH 7.0).

Range in Characteristics

Soil temperature: 40 to 46 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 10 to 24 inches
Depth to the seasonal high water table: 0 to 12 inches
Depth to the 2C horizon: 20 to 40 inches

A horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Redox concentrations: Few to many

Redox depletions: None to common

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 7.8

Cg horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Redox concentrations: Few to common

Redox depletions: None to common

Texture (less than 2 mm): Sandy loam, loam, silt loam, or silty clay loam with strata of finer and coarser textured material

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 25 percent gravel

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

2C horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Redox concentrations: None to common

Redox depletions: None to common

Texture (less than 2 mm): Loamy sand, loamy coarse sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—
10 to 20 percent cobbles; 25 to 50 percent gravel

Reaction: pH 6.6 to 7.8

Bowery Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, fan, landslide, stream terrace,
fan on escarpment, swale on fan, swale on hill,
swale on moraine, and fan on mountain

Parent material: Loamy alluvium or colluvium

Slope range: 0 to 45 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees

Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive,
frigid Pachic Haplustolls

Typical Pedon

Bowery loam, in an area of Bowery loam, 2 to 8 percent slopes, in an area of rangeland, 1,250 feet south and 800 feet east of the northwest corner of sec. 24, T. 4 N., R. 6 E.; Gallatin County, Montana.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate very fine and fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine pores; 5 percent gravel; slightly acid; clear smooth boundary.

A2—9 to 22 inches; dark gray (10YR 4/1) loam; very dark brown (10YR 2/2) moist; moderate very fine subangular blocky structure parting to weak very fine and moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; 5 percent gravel; neutral; gradual smooth boundary.

Bw1—22 to 36 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak very fine and fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; 10 percent gravel; neutral; gradual smooth boundary.

Bw2—36 to 60 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, firm, moderately sticky, moderately plastic; few fine roots; few very fine pores; 10 percent gravel; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 16 to 60 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 7.3

Bw1 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 to 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 10 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent gravel

Reaction: pH 6.1 to 7.3

Bw2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or fine sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 10 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent gravel

Reaction: pH 6.1 to 7.3

Boxwell Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Swale on plain

Parent material: Loamy residuum weathered from sandstone and siltstone

Slope range: 2 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Boxwell loam, in an area of Cabbart-Boxwell loams, 2 to 8 percent slopes, in an area of cropland, 950 feet south and 200 feet west of the northeast corner of sec. 9, T. 3 N., R. 17 E.; USGS Gibson topographic quadrangle (lat. 46°01'47" N.; long. 109°36'41" W.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bw—7 to 13 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and many very fine and fine roots; many very fine pores; strongly

effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk1—13 to 17 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium roots; many fine pores; common fine and medium soft masses of lime; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk2—17 to 28 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; soft, friable, slightly sticky, slightly plastic; many very fine pores; common fine and medium soft masses of lime; 10 percent gravel; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Cr—28 to 60 inches; light gray (2.5Y 7/2) weakly consolidated interbedded siltstone and sandstone; strongly effervescent.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 5 to 12 inches; the upper 7 inches, when mixed, meet the color requirements of a mollic epipedon.

Depth to the Bk horizon: 8 to 16 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.1 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 5 moist;

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, silt loam, or silty clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Breeton Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Fan, hill, and stream terrace

Parent material: Coarse-loamy alluvium

Slope range: 2 to 15 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Pachic Haplustolls

Typical Pedon

Breeton sandy loam, in an area of Breeton sandy loam, 8 to 15 percent slopes, in an area of pasture, 1,400 feet south and 550 feet west of the northeast corner of sec. 8, T. 2 S., R. 15 E.; USGS Ross Canyon topographic quadrangle (lat. 45°40'40" N.; long. 109°53'37" W.)

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; slightly acid (pH 6.4) clear smooth boundary.

A2—5 to 13 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; neutral (pH 6.6); clear smooth boundary.

A3—13 to 19 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw—19 to 30 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel; neutral (pH 7.0); gradual smooth boundary.

BC—30 to 60 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine pores; 10 percent gravel; neutral (pH 7.0).

Range in Characteristics

Soil temperature: 38 to 45 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 16 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Sandy loam or loam

Clay content: 8 to 25 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam, coarse sandy loam, or loam

Clay content: 8 to 18 percent

Content of rock fragments: 5 to 30 percent gravel

Reaction: pH 6.1 to 7.8

BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam, coarse sandy loam, or loamy fine sand

Clay content: 5 to 15 percent

Content of rock fragments: 10 to 30 percent gravel

Reaction: pH 6.1 to 7.8

Bridger Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Fan, landslide, moraine, mountain, terrace, and fan on mountain

Parent material: Silty and clayey alluvium or till

Slope range: 2 to 45 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Bridger cobbly clay loam, in an area of Tibson, extremely bouldery-Bridger, extremely bouldery-Adel complex, 8 to 35 percent slopes, in an area of rangeland, 2,200 feet north and 800 feet east of the southwest corner of sec. 2, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°36'08" N.; long. 110°12'50" W.)

A—0 to 8 inches; dark gray (10YR 4/1) cobbly clay loam, very dark gray (10YR 3/1) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine to medium roots; many very fine and fine pores; 10 percent gravel; 10 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bt1—8 to 12 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; strong very fine and fine subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; common very fine to medium roots; common very fine and fine pores; common distinct discontinuous dark grayish brown (10YR 4/2) moist; clay films on faces of peds; 5 percent gravel; 5 percent cobbles; slightly acid (pH 6.2); clear smooth boundary.

Bt2—12 to 19 inches; dark grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky, very plastic; common very fine to medium roots; few very fine and fine pores; many prominent continuous dark yellowish brown (2.5Y 4/2) moist; clay films on faces of peds; 5 percent gravel; 5 percent cobbles; neutral (pH 6.8); clear smooth boundary.

Bt3—19 to 27 inches; light olive brown (2.5Y 5/3) clay, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure; extremely hard, extremely firm, very sticky, very plastic; few very fine and fine roots; few very fine pores; common prominent continuous dark yellowish brown (2.5Y 4/2) moist; clay films on faces of peds; 5 percent

gravel; 5 percent cobbles; neutral (pH 7.2); clear smooth boundary.

Btk—27 to 34 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine and medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; few distinct patchy dark yellowish brown (2.5Y 4/2) moist; clay films on faces of peds; many fine and medium irregular masses of lime; 10 percent gravel; 2 percent subangular cobbles; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk—34 to 60 inches; light brownish gray (2.5Y 6/2) gravelly clay loam, grayish brown (2.5Y 5/2) moist; strong fine and medium angular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine pores; many fine irregular masses of lime; 10 percent gravel; 5 percent cobbles; violently effervescent; slightly alkaline (pH 7.8).

Range in Characteristics

Soil temperature: 36 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 16 inches

Depth to the Bk horizon: 17 to 40 inches

Note: Some pedons do not have a Btk horizon.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Clay loam or loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel

Reaction: pH 6.6 to 7.8

Btk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or clay
Clay content: 27 to 40 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent stones and cobbles; 5 to 25 percent gravel
Calcium carbonate equivalent: 3 to 12 percent
Reaction: pH 7.4 to 7.8

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 5 to 7 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam, sandy clay loam, or loam
Clay content: 18 to 35 percent
Content of rock fragments: 5 to 35 percent—0 to 20 percent stones and cobbles; 5 to 30 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

Cabba Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment, hill, and knoll on plain
Parent material: Loamy residuum weathered from sandstone and siltstone
Slope range: 2 to 60 percent
Elevation range: 3,900 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents

Typical Pedon

Cabba loam, in an area of Cabba-Doney loams, 8 to 35 percent slopes, in an area of rangeland, 1,300 feet south and 1,600 feet east of the northwest corner of sec. 21, T. 3 N., R. 13 E.; USGS Grosfield Ranch topographic quadrangle (lat. 45°59'47" N.; long. 110°07'06" W.)

A—0 to 4 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium platy structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk1—4 to 9 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak

medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine pores; few fine soft masses of lime; 5 percent channers; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bk2—9 to 15 inches; light olive gray (5Y 6/2) gravelly loam, olive gray (5Y 5/2) moist; weak coarse prismatic structure; soft; very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; common fine soft masses of lime; 20 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Cr—15 to 60 inches; soft sedimentary sandstone and siltstone beds that crush to a loam; strongly effervescent.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y
Value: 3 to 6 dry; 3 or 4 moist
Chroma: 1 to 3
Texture (less than 2 mm): Loam or clay loam
Clay content: 10 to 35 percent
Content of rock fragments: 0 to 60 percent—0 to 30 percent stones and cobbles; 0 to 30 percent gravel or channers
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 6.6 to 9.0

Bk horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 1 to 4
Texture (less than 2 mm): Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel or channers
Calcium carbonate equivalent: 2 to 15 percent
Reaction: pH 7.4 to 9.0

Cabbart Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, strath terrace, and knoll on plain

Parent material: Loamy residuum weathered from sandstone and siltstone

Slope range: 2 to 60 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

Typical Pedon

Cabbart loam, in an area of grassland, 1,200 feet north and 2,450 feet east of the southwest corner of sec. 7, T. 20 N., R. 3 W.; Cascade County, Montana.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots and pores; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk1—3 to 7 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure; hard, very friable, slightly sticky, slightly plastic; many fine roots and pores; few fine masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk2—7 to 16 inches; pale yellow (2.5Y 7/4) loam, light yellowish brown (2.5Y 6/4) moist; weak coarse prismatic structure; hard, very friable, slightly sticky, slightly plastic; many fine roots and pores; common fine masses of lime; strongly effervescent; moderately alkaline (8.4); clear wavy boundary.

BC—16 to 18 inches; pale yellow (2.5Y 7/4) loam, light yellowish brown (2.5Y 6/4) moist; weak coarse prismatic structure; very hard, friable, slightly sticky, slightly plastic; many fine roots and pores; disseminated lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Cr—18 to 60 inches; pale yellow (5Y 7/4) semiconsolidated loamy sedimentary beds that crush to loam; few widely spaced vertical cracks in upper 4 to 6 inches with roots; root mat at contact of beds.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

Note: Some pedons do not have a BC horizon.

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 60 percent—0 to 20 percent cobbles; 0 to 40 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 45 percent—0 to 15 percent hard gravel; 0 to 45 percent soft gravel

Calcium carbonate equivalent: 10 to 25 percent

Reaction: pH 7.4 to 9.0

BC horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 45 percent—0 to 15 percent hard gravel; 0 to 45 percent soft gravel

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 7.4 to 9.0

Cambeth Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill

Parent material: Silty residuum weathered from sandstone and siltstone

Slope range: 4 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 40 to 45 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Aridic Calcustepts

Typical Pedon

Cambeth silt loam, in an area of Cabbart-Cambeth complex, 4 to 35 percent slopes, in an area of rangeland, 1,700 feet south and 2,400 feet east of the northwest corner of sec. 8, T. 2 N., R. 18 E.; USGS Stephens Hill NE topographic quadrangle (lat. 45°56'20" N.; long. 109°31'03" W.)

A—0 to 4 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; slightly alkaline (pH 7.4); clear smooth boundary.

Bw—4 to 13 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; common fine pores; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk—13 to 24 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few medium roots; common fine pores; few soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—24 to 60 inches; weakly consolidated siltstone that crushes to silt loam; strongly effervescent.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 10 to 15 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Silt loam

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Silt loam, silty clay loam, or loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist;

Chroma: 2 to 4

Texture (less than 2 mm): Silt loam, silty clay loam, or loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 20 percent

Reaction: pH 7.9 to 9.0

Castner Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, terrace, and knoll on plain

Parent material: Residuum weathered from sandstone

Slope range: 0 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Castner channery loam, in an area of Castner-Absarokee complex, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet north and 400 feet east of the southwest corner of sec. 13, T. 1 S., R. 15 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°44'38" N.; long. 109°49'33" W.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) channery loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; 5 percent flagstones; 15 percent channers; neutral (pH 7.2); abrupt smooth boundary.

A2—5 to 10 inches; brown (10YR 4/3) very channery loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; many very fine and fine pores; 5 percent cobbles; 50 percent channers; slightly effervescent on undersides of channers; neutral (pH 7.2); clear smooth boundary.

Bk—10 to 18 inches; light brownish gray (10YR 6/2) extremely channery loam, grayish brown (10YR

5/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; few fine threads of lime; few carbonate coats on undersides of channers; 10 percent flagstones; 55 percent channers; strongly effervescent; slightly alkaline (pH 7.8); abrupt smooth boundary.

R—18 inches; hard fractured noncalcareous sandstone.

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

A1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 5 to 45 percent—0 to 25 percent stones, flagstones, or cobbles; 5 to 30 percent gravel or channers

Reaction: pH 6.6 to 7.8

A2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 35 to 70 percent—5 to 20 percent stones, flagstones, or cobbles; 35 to 55 percent gravel or channers

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 35 to 80 percent—10 to 25 percent stones, flagstones, or cobbles; 25 to 60 percent gravel or channers

Calcium carbonate equivalent: 3 to 15 percent

Reaction: pH 6.6 to 8.4

Cheadle Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Residuum weathered from sandstone or gabbro

Slope range: 2 to 70 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryolls

Typical Pedon

Cheadle channery loam, in an area of Cheadle channery loam, 2 to 15 percent slopes, in an area of rangeland, 2,200 feet north and 1,800 feet west of the southeast corner of sec. 36, T. 2 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°36'54" N.; long. 110°10'57" W.)

A1—0 to 5 inches; dark grayish brown (10YR 4/2) channery loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 25 percent channers; 5 percent flagstones; neutral (pH 6.8); abrupt smooth boundary.

A2—5 to 11 inches; grayish brown (10YR 5/2) very channery fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; slightly effervescent; 10 percent gravel; 20 percent channers; 10 percent flagstones; slightly alkaline (pH 7.4); clear smooth boundary.

Bk—11 to 14 inches; light brownish gray (10YR 6/2) extremely flaggy fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; discontinuous carbonate coats on rock fragments; strongly effervescent; 20 percent gravel; 15 percent channers; 30 percent

flagstones; slightly alkaline (pH 7.8); abrupt smooth boundary.

R—14 inches; hard sandstone.

Range in Characteristics

Soil temperature: 37 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 16 inches

Depth to the Bk horizon: 7 to 16 inches

Depth to bedrock: 10 to 20 inches

A1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 60 percent—0 to 50 percent stones, flagstones or cobbles, and channers; 0 to 10 percent gravel

Reaction: pH 6.6 to 7.8

A2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Fine sandy loam, loam, or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 75 percent—0 to 65 percent stones, flagstones or cobbles, and channers; 10 to 30 percent gravel

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 7.4 to 9.0

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam, loam, or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 75 percent—0 to 65 percent stones, flagstones or cobbles, and channers; 20 to 30 percent gravel

Calcium carbonate equivalent: 3 to 10 percent

Reaction: pH 7.4 to 9.0

Chinook Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Hill and swale on plain

Parent material: Sandy residuum weathered from sandstone

Slope range: 4 to 25 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Chinook fine sandy loam, in an area of Chinook-Twilight fine sandy loams, 8 to 25 percent slopes, in an area of rangeland, 2,500 feet north and 1,000 feet east of the southwest corner of sec. 8, T. 5 N., R. 15 E.; USGS Melville NW topographic quadrangle (lat. 46°11'51" N.; long. 109°52'44" W.)

A1—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; common medium and coarse and many very fine and fine roots; many very fine and fine pores; neutral (pH 6.8); clear wavy boundary.

A2—3 to 10 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate very fine and fine granular; soft, very friable, nonsticky, nonplastic; common fine and medium and many very fine roots; many very fine and fine pores; neutral (pH 7.2); gradual wavy boundary.

Bw1—10 to 20 inches; light olive brown (2.5Y 5/3) sandy loam, olive brown (2.5Y 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine pores; slightly alkaline (pH 7.4); gradual wavy boundary.

Bw2—20 to 31 inches; light yellowish brown (2.5Y 6/3) sandy loam, light olive brown (2.5Y 5/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine and fine pores; slightly alkaline (pH 7.4); gradual wavy boundary.

Bk1—31 to 45 inches; light brownish gray (2.5Y 6/2) sandy loam, light olive brown (2.5Y 5/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; common very fine and fine pores; common fine irregular soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.

Bk2—45 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, light olive brown (2.5Y 5/3) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine roots; common very fine and fine pores; common fine irregular soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 35 inches

Note: Some pedons have a BC horizon of loamy sand or loamy fine sand.

A1 horizon

Hue: 10YR or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent gravel

Reaction: pH 6.6 to 8.4

A2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 to 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent gravel

Reaction: pH 6.6 to 8.4

Bw horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 6.6 to 9.0

Bk2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 6.6 to 9.0

Clunton Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Very poorly drained

Landform: Depression on flood plain

Parent material: Fine-loamy over sandy and gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 85 to 130 days

Taxonomic Class: Fine-Loamy, mixed, superactive, frigid Fluvaquentic Endoaquolls

Typical Pedon

Clunton silty clay loam, 1,600 feet north and 1,200 feet west of the southeast corner of sec. 30, T. 4 N., R. 2 W.; Jefferson County, Montana.

Oa—0 to 4 inches; very dark gray (5Y 3/1) muck, very dark gray (5Y 3/1) dry; neutral (pH 6.8); clear smooth boundary.

Ag—4 to 18 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; many distinct black (5Y 2.5/1) redox depletions; few faint strong brown (7.5YR 5/6) redox concentrations; moderate medium prismatic structure; hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine and fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

Cg1—18 to 30 inches; very dark gray (5Y 3/1) silty clay loam, dark gray (5Y 4/1) dry; common faint very dark gray (5Y 3/1) redox depletions; many distinct strong brown (7.5YR 5/6) redox concentrations; massive; hard, firm, moderately sticky, moderately plastic; common very fine roots; few very fine tubular pores; neutral (pH 7.2); clear wavy boundary.

Cg2—30 to 34 inches; very dark gray (5Y 3/1) loam consisting of strata of loam and sandy loam, dark gray (5Y 4/1) dry; common distinct strong brown (7.5YR 5/6) redox concentrations; common faint very dark gray (5Y 3/1) redox depletions; massive; hard, friable, slightly sticky, slightly plastic; few very fine roots; neutral (pH 7.2); gradual wavy boundary.

Cg3—34 to 42 inches; dark gray (5Y 4/1) silty clay loam consisting of strata of silty clay loam and sandy loam, gray (5Y 5/1) dry; common distinct strong brown (7.5YR 5/6) redox concentrations; common faint very dark gray (5Y 3/1) redox depletions; massive; slightly hard, friable, slightly sticky, slightly plastic; neutral (pH 7.0); gradual wavy boundary.

2Cg4—42 to 64 inches; dark gray (10YR 4/1) gravelly sandy loam, grayish brown (2.5Y 5/2) dry; many distinct strong brown (7.5YR 5/6) redox concentrations; few faint very dark gray (5Y 3/1) redox depletions; massive; slightly hard, friable, slightly sticky, nonplastic; 15 percent gravel; neutral (pH 7.0).

Range in Characteristics

Soil temperature: 40 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 24 inches

Depth to the seasonal high water table: 0 to 12 inches for extended periods during spring and summer

Clay content (weighted average in particle-size control section): 18 to 27 percent

Ag horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1 or 2

Redox concentrations: Few to common; 7.5YR 5/6 or 5YR 5/6

Redox depletions: Common or many 10YR 4/1, 10YR 3/1, 5Y 3/1, 5Y 2.5/1 or 5Y 4/1

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 30 percent

Reaction: pH 6.1 to 7.3

Cg1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 3 to 5 moist

Chroma: 1 or 2

Redox concentrations: Few to common; 7.5YR 5/6 or 5YR 5/6

Redox depletions: Common or many; 10YR 4/1, 10YR 3/1, 5Y 3/1, or 5Y 4/1

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent gravel

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.8

Cg2 and Cg3 horizons

Hue: 2.5Y or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Redox concentrations: Few to common; 7.5YR 5/6 or 5YR 5/6

Redox depletions: Common or many; 10YR 4/1, 10YR 3/1, 5Y 3/1, or 5Y 4/1

Texture (less than 2 mm): Silt loam, loam, clay loam, or silty clay loam with thin strata of finer and coarser materials

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent gravel

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.8

2Cg4 horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 0 to 2

Redox concentrations: Common or many; 7.5YR 5/6 or 5YR 5/6

Redox depletions: Few to many; 10YR 4/1, 10YR 3/1, 5Y 3/1, or 5Y 4/1

Texture (less than 2 mm): Sandy loam or loam with strata of loamy sand, silt loam, or very fine sandy loam

Clay content: 5 to 25 percent

Content of rock fragments: 0 to 25 percent gravel

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.8

Cowood Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Residuum weathered from sandstone over gabbro or residuum weathered from gabbro

Slope range: 4 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Eutrocryepts

Typical Pedon

Cowood very channery loam, in an area of Cowood very channery loam, 4 to 25 percent slopes, in an area of coniferous forest, 1,700 feet north and 200 feet west of the southeast corner of sec. 1, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°36'05" N.; long. 110°03'15" W.)

Oi—0 to 3 inches; slightly decayed needles, twigs, and leaves; moderately acid (pH 6.0); abrupt smooth boundary.

E—3 to 8 inches; grayish brown (10YR 5/2) very channery loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to weak fine granular; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 30 percent channers; 10 percent cobbles; moderately acid (pH 6.0); clear smooth boundary.

Bw—8 to 19 inches; brown (10YR 5/3) extremely channery loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; 45 percent channers; 20 percent cobbles; moderately acid (pH 6.0); abrupt smooth boundary.

R—19 inches; fine-grained gabbro.

Range in Characteristics

Soil temperature: 35 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to bedrock: 10 to 20 inches

Note: Some pedons have an A horizon in place of the E horizon.

E horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 2 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 70 percent—
10 to 50 percent stones and cobbles; 15 to
50 percent gravel or channers

Reaction: pH 5.1 to 6.0

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 60 to 80 percent
stones, cobbles, gravel, or channers

Reaction: pH 5.1 to 6.5

Creed Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Plain, stream terrace, depression on fan,
and depression on terrace

Parent material: Clayey alluvium

Slope range: 0 to 8 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Aridic
Natrustalfs

Typical Pedon

Creed loam, in an area of Gerdrum-Creed complex, 0 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 2,350 feet east of the southwest corner of sec. 12, T. 3 N., R. 18 E.; USGS Locomotive Butte topographic quadrangle (lat. 46°01'28" N.; long. 109°26'01" W.)

A—0 to 2 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.0); clear smooth boundary.

E—2 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak thin and medium platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.0); abrupt smooth boundary.

Btn1—5 to 9 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium and coarse angular blocky structure; very hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; many faint discontinuous olive brown (2.5Y 4/3) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.4); clear smooth boundary.

Btn2—9 to 14 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate medium

prismatic structure parting to moderate medium and coarse angular blocky; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; many distinct discontinuous dark olive brown (2.5Y 3/3), moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.4); abrupt smooth boundary.

Btnk—14 to 22 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate coarse prismatic structure parting to weak coarse angular blocky; very hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; few distinct patchy olive brown (2.5Y 4/3) moist; clay films on faces of peds; few fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

Bky—22 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; very hard, friable, moderately sticky, moderately plastic; few fine and medium roots; few very fine and fine pores; few fine and medium masses of gypsum; common fine and medium soft masses of lime; strongly effervescent moderately alkaline (pH 8.4); gradual smooth boundary.

Byz—32 to 60 inches; light gray (2.5Y 7/2) clay loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; very hard, friable, moderately sticky, moderately plastic; many medium and coarse masses of gypsum; common medium and coarse masses of salt; few fine soft masses of lime; strongly effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Btnk horizon: 10 to 20 inches

Depth to the Bky horizon: 22 to 30 inches

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 8.4

E horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 8.4

Btn horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, clay, silty clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 15 percent gravel

Electrical conductivity: 2 to 4 mmhos/cm

Sodium adsorption ratio: 8 to 13

Reaction: pH 6.6 to 9.0

Btnk and Bky horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay, silty clay loam, loam, or clay

Clay content: 25 to 45 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Gypsum content: 0 to 2 percent

Reaction: pH 7.9 to 9.0

Byz horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 25

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.0

Danaher Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inches/hour)

Landform: Mountain

Parent material: Silty and clayey alluvium or colluvium

Slope range: 15 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic
Glossocryalfs

Typical Pedon

Danaher loam, in an area of Danaher-Timberlin complex, 25 to 60 percent slopes, in an area of coniferous forest, 2,640 feet south and 2,000 feet east of the northwest corner of sec. 26, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°32'47" N.; long. 110°05'12" W.)

O—1 to 0 inch; partially decomposed twigs and needles; abrupt wavy boundary.

A—0 to 2 inches; brown (7.5YR 5/2) loam; dark brown (7.5YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine pores; 10 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

E—2 to 9 inches; pinkish gray (7.5YR 7/2) loam, brown (7.5YR 4/2) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine pores; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

E/Bt—9 to 17 inches; E part (60 percent) pink (7.5YR 7/3) loam, brown (7.5YR 5/3) moist tongues; Bt part (40 percent) reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/3) moist; moderate fine and medium subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; few fine to coarse roots; few medium and many very fine and fine pores; 10 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt1—17 to 28 inches; reddish brown (5YR 5/4) gravelly clay loam, reddish brown (5YR 4/3) moist; strong fine and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few fine to coarse roots; few medium and many very fine and fine pores; common discontinuous faint dark reddish brown (5YR 3/4) moist; clay films on faces of peds; 15 percent gravel; 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt2—28 to 41 inches; reddish brown (2.5YR 5/4) gravelly clay loam; reddish brown (2.5YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky,

very plastic; few coarse roots; common very fine and fine pores; common faint dark reddish brown (5YR 3/4) moist; clay films on faces of peds; 15 percent gravel; 10 percent cobbles; moderately acid (pH 5.8); clear wavy boundary.

Bt3—41 to 60 inches; light reddish brown (5YR 6/4) gravelly clay loam; reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, very sticky, very plastic; few coarse roots; few very fine and fine pores; few patchy faint dark reddish brown (5YR 3/4) moist; clay films on faces of peds and rock fragments; 25 percent gravel; 5 percent cobbles; moderately acid (pH 5.8).

Range in Characteristics

Soil temperature: 36 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bt horizon: 5 to 20 inches

Notes: Thickness of the A horizon does not exceed 2 inches. Some pedons have a BC horizon.

A horizon

Hue: 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel

Reaction: pH 5.6 to 7.3

E horizon

Hue: 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel

Reaction: pH 5.6 to 7.3

E/Bt horizon

Hue: 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y

Value: E part—6 or 7, Bt part—4 to 6 dry;

E part—4 or 5, Bt part—3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, silt loam, clay loam, or silty clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 3 percent cobbles; 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bt horizons

Hue: 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture (less than 2 mm): Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 25 percent gravel
Reaction: pH 5.6 to 7.3

Danvers Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.20 inch/hour)
Landform: Fan and terrace
Parent material: Loamy alluvium
Slope range: 0 to 8 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine, smectitic, frigid Vertic
 Argiustolls

Typical Pedon

Danvers gravelly clay loam, in an area of Danvers gravelly clay loam, 2 to 8 percent slopes, in an area of hayland, 2,100 feet south and 450 feet west of the northeast corner of sec. 26, T. 4 N., R. 14 E.; USGS Melville topographic quadrangle (lat. 46°04'09" N.; long. 109°56'13" W.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; moderately hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; common very fine pores; 15 percent gravel; 5 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.

Bt—7 to 16 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong fine subangular blocky; very hard, friable, moderately sticky, moderately plastic; few fine and common very fine roots; few fine and common very fine pores; many discontinuous distinct dark brown (7.5YR 3/4) moist; clay films on faces of peds and lining pores; 10 percent gravel; slightly alkaline (pH 7.6); clear smooth boundary.

Btk—16 to 22 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; moderately hard, friable, moderately sticky, moderately plastic; common very fine roots; few fine pores; few patchy distinct dark brown (10YR 3/3) moist; clay films on faces of peds; many fine soft masses of lime; 10 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk1—22 to 31 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; moderately hard, friable, moderately sticky, moderately plastic; few very fine roots; few fine pores; many fine and medium soft masses of lime; 10 percent gravel; violently effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

2Bk2—31 to 60 inches; light gray (10YR 7/2) gravelly clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine pores; carbonate coats on undersides of rock fragments; many fine and medium soft masses of lime; 20 percent gravel; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 12 inches
Depth to the calcic horizon: 14 to 25 inches

A horizon

Hue: 7.5YR or 10YR
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam or loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel
Reaction: pH 6.1 to 7.8

Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam, clay, silty clay, or silty clay loam
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 8.4

Btk horizon*Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, clay, silty clay, or silty clay loam*Clay content:* 35 to 45 percent*Content of rock fragments:* 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent gravel*Calcium carbonate equivalent:* 10 to 20 percent*Reaction:* pH 7.4 to 8.4**Bk1 horizon***Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 6 to 8 dry; 5 or 6 moist*Chroma:* 1 to 3*Texture (less than 2 mm):* Clay loam, silty clay loam, silty clay, or clay*Clay content:* 27 to 45 percent*Content of rock fragments:* 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel*Calcium carbonate equivalent:* 20 to 40 percent*Reaction:* pH 7.4 to 8.4**2Bk2 horizon***Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 6 or 7 dry; 5 or 6 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, loam, or sandy loam*Clay content:* 10 to 35 percent*Content of rock fragments:* 15 to 60 percent—0 to 10 percent stones and cobbles; 15 to 50 percent gravel*Calcium carbonate equivalent:* 15 to 35 percent*Reaction:* pH 7.4 to 8.4**Delpoint Series***Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Escarpment, hill, strath terrace, stream terrace, knoll on plain, and swale on plain*Parent material:* Loamy residuum weathered from sandstone and siltstone*Slope range:* 2 to 60 percent*Elevation range:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Mean annual air temperature:* 43 to 46 degrees F*Frost-free period:* 95 to 125 days**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Aridic Haplusteps**Typical Pedon**

Delpoint loam, in an area of Cabbart-Delpoint, calcareous, loams, 2 to 8 percent slopes, in an area of hayland, 400 feet south and 600 feet east of the northwest corner of sec. 36, T. 3 N., R. 17 E.; USGS Stephens Hill NE topographic quadrangle (lat. 45°58'21" N.; long. 109°34'00" W.)

Ap—0 to 5 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; 2 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bw—5 to 11 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; common fine pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

Bk—11 to 28 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few medium roots; common fine pores; few soft masses of lime; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—28 to 60 inches; weakly consolidated loamy sedimentary beds that crush to loam; violently effervescent.

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the Bk horizon:* 10 to 20 inches*Depth to the Cr horizon:* 20 to 40 inches*Note:* When mixed to 7 inches, the A horizon does not meet the requirements of a mollic epipedon.**A horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 3 to 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Loam*Clay content:* 18 to 27 percent*Content of rock fragments:* 0 to 5 percent gravel*Calcium carbonate equivalent:* 0 to 10 percent*Reaction:* pH 6.6 to 8.4**Bw horizon***Hue:* 10YR, 2.5Y, or 5Y*Value:* 5 to 7 dry; 4 or 5 moist*Chroma:* 2 to 4

Texture (less than 2 mm): Loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, clay loam, or sandy loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Dimmick Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Very poorly drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Depression on plain and swale on plain
Parent material: Clayey alluvium
Slope range: 0 to 2 percent
Elevation range: 3,750 to 5,600 feet
Mean annual precipitation: 10 to 19 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Vertic Epiaquolls

Typical Pedon

Dimmick silty clay, in an area of Dimmick silty clay, 0 to 2 percent slopes, in an area of rangeland, 1,100 feet north and 1,200 feet west of the southeast corner of sec. 27, T. 4 N., R. 16 E.; USGS Gibson SW topographic quadrangle (lat. 46°03'45" N.; long. 109°42'46" W.)

A—0 to 2 inches; dark gray (5Y 4/1) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; moderately hard, firm, very sticky, very plastic; many very fine and fine roots; many very fine and fine pores; moderately alkaline (pH 8.4); clear smooth boundary.

Ag1—2 to 7 inches; dark gray (5Y 4/1) clay, dark olive gray (5Y 3/2) moist; common fine distinct olive brown (2.5Y 4/4) and dark yellowish brown (10YR 4/6) moist, redox concentrations; strong fine and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; common very fine and fine roots; few very fine and fine pores;

moderately alkaline (pH 8.4); clear smooth boundary.

Ag2—7 to 14 inches; gray (5Y 5/1) clay, dark olive gray (5Y 3/2) moist; few fine distinct olive brown (2.5Y 4/4) and dark yellowish brown (10YR 4/6) moist, redox concentrations; strong fine and medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; few very fine and fine roots; few very fine pores; slightly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bkg1—14 to 34 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, very plastic; few very fine and fine roots; few very fine pores; common fine and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.6); gradual smooth boundary.

Bkg2—34 to 60 inches; grayish brown (2.5Y 5/2) clay, dark gray (5Y 4/1) moist; common fine distinct olive brown (2.5Y 4/4) and dark yellowish brown (10YR 4/6) moist, redox concentrations; moderate coarse prismatic structure; very hard, firm, very sticky, very plastic; few fine soft masses of lime; strongly effervescent; strongly alkaline (pH 8.8).

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 14 to 20 inches
Depth to the seasonal high water table: +12 to 6 inches; perched
Depth to the Bkg horizon: 10 to 24 inches

A horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Redox concentrations: Few to many; chroma of 4 or 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Silty clay

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 7.8

Bkg horizons

Hue: 2.5Y, 5Y, or N

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 0 to 2

Redox concentrations: None to common; chroma of 4 or 6

Texture (less than 2 mm): Clay or silty clay

Clay content: 40 to 60 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 3 to 15 percent
Reaction: pH 6.6 to 8.4

Doby Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.20 inch/hour)
Landform: Mountain
Parent material: Clayey residuum weathered from shale and siltstone
Slope range: 15 to 60 percent
Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 36 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Clayey, smectitic, shallow Ustic Haplocryolls

Typical Pedon

Doby clay loam, in an area of Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes, in an area of rangeland, 300 feet north and 1,300 feet east of the southwest corner of sec. 2, T. 4 N., R. 7 E.; Gallatin County, Montana.

- A—0 to 5 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; soft, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine vesicular pores; 5 percent channers; neutral; abrupt smooth boundary.
- Bw1—5 to 10 inches; grayish brown (2.5Y 5/2) clay, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; hard, firm, very sticky, very plastic; many very fine and fine roots; few very fine tubular pores; 5 percent channers; neutral; clear smooth boundary.
- Bw2—10 to 15 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (10YR 4/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky, very plastic; few fine and medium roots; few very fine vesicular pores; 10 percent channers; neutral; clear smooth boundary.
- C—15 to 19 inches; light brownish gray (2.5Y 6/2) channery clay, dark gray (10YR 4/1) moist; weak coarse prismatic structure; hard, firm, very sticky, very plastic; few fine and medium roots; 20 percent soft shale fragments; neutral; clear smooth boundary.

Cr—19 to 60 inches; gray (10YR 5/1) dark gray semiconsolidated shale (10YR 4/1) moist; few very fine and fine roots between shale fragments; strongly effervescent; moderately alkaline; common irregular carbonate coats on undersides of shale fragments.

Range in Characteristics

Soil temperature: 36 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Texture (less than 2 mm): Clay loam
Clay content: 30 to 40 percent
Content of rock fragments: 0 to 25 percent—0 to 10 percent stones and cobbles; 0 to 15 percent gravel or channers
Reaction: pH 6.6 to 7.8

Bw horizons

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 1 to 4
Texture (less than 2 mm): Clay or silty clay
Clay content: 40 to 55 percent
Content of rock fragments: 0 to 25 percent gravel or channers; 0 to 50 percent soft shale chips
Reaction: pH 6.6 to 7.8

Doney Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment, hill, and swale on plain
Parent material: Loamy residuum weathered from sandstone and siltstone
Slope range: 2 to 60 percent
Elevation range: 3,900 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustepts

Typical Pedon

Doney loam, in an area of Doney-Cabba loams, 2 to 8 percent slopes, in an area of rangeland, 1,300 feet north and 200 feet east of the southwest corner of

sec. 24, T. 4 N., R. 14 E.; USGS Melville topographic quadrangle (lat. 46°04'41" N.; long. 109°56'08" W.)

A—0 to 5 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bw—5 to 11 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine pores; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

Bk1—11 to 18 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few fine and common very fine roots; common fine pores; common fine threads and soft masses of lime; 10 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—18 to 33 inches; light gray (10YR 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few very fine roots; few fine pores; 10 percent gravel; common medium soft masses of lime; violently effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

Cr—33 to 60 inches; weakly consolidated loamy sedimentary beds that crush to loam; violently effervescent.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bk horizons

Hue: 2.5Y or 10YR

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Duckcreek Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Mountain

Parent material: Clayey residuum weathered from sandstone and shale

Slope range: 8 to 45 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Duckcreek loam, in an area of Duckcreek-Arrowpeak complex, 8 to 45 percent slopes, in an area of rangeland, 2,400 feet south and 200 feet east of the northwest corner of sec. 19, T. 2 N., R. 12 E.; USGS Fairview Peak topographic quadrangle (lat. 45°54'31" N.; long. 110°17'28" W.)

A—0 to 6 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; many very fine and fine pores; 5 percent gravel; 5 percent stones; neutral (pH 7.2); clear smooth boundary.

- Bt1**—6 to 15 inches; dark yellowish brown (10YR 4/4) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to strong fine granular; moderately hard, friable, moderately sticky, moderately plastic; few fine and medium and common very fine roots; common very fine pores; common faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; 10 percent gravel; neutral (pH 7.2); clear smooth boundary.
- Bt2**—15 to 29 inches; light yellowish brown (10YR 6/4) gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to moderate fine granular; moderately hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common very fine pores; common faint discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; 20 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.
- Bk**—29 to 36 inches; light gray (2.5Y 7/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine pores; common fine soft masses of lime; 30 percent soft shale fragments; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
- Cr**—36 to 60 inches; moderately hard black shale that can be hand augered; strongly effervescent.

Range in Characteristics

Soil temperature: 36 to 40 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 8 to 15 inches
Depth to the Bk horizon: 15 to 35 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 1 to 3
Texture (less than 2 mm): Loam
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent stones and flagstones; 0 to 5 percent cobbles; 0 to 15 percent gravel or channers; 0 to 20 percent soft shale chips
Reaction: pH 5.6 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 50 percent
Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 15 percent gravel or channers; 0 to 20 percent soft shale chips
Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel or channers; 0 to 20 percent soft shale chips
Reaction: pH 6.1 to 7.8

Bk horizon

Hue: 10YR to 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy clay loam, clay loam, or clay
Clay content: 27 to 45 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel or channers; 10 to 35 percent soft shale chips
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Elve Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid (2 to 6 inches/hour)
Landform: Mountain
Parent material: Loamy alluvium weathered from volcanic breccia
Slope range: 25 to 80 percent
Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 36 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Eutrocrypts

Typical Pedon

Elve very gravelly loam, in an area of Merino-Elve-Rock outcrop complex, 25 to 80 percent slopes, in an area of coniferous forest, 700 feet north and 1,100 feet west of the southeast corner of sec. 13, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°34'13" N.; long. 110°03'26" W.)

Oi—0 to 1 inch; slightly decayed needles, twigs, and leaves; moderately acid (pH 6.0); abrupt smooth boundary.

E—0 to 6 inches; grayish brown (2.5Y 6/2) very gravelly loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; many very fine and fine pores; 40 percent gravel; neutral (pH 6.8); abrupt wavy boundary.

Bw1—6 to 17 inches; light brownish gray (2.5Y 6/2) extremely gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine to coarse and common very fine roots; many very fine and fine pores; 60 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bw2—17 to 30 inches; light brownish gray (2.5Y 6/2) extremely gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to coarse roots; many very fine pores; 60 percent gravel; neutral (pH 6.8); clear wavy boundary.

BC—30 to 60 inches; light brownish gray (2.5Y 6/2) extremely gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; 10 percent cobbles; 60 percent gravel; neutral (pH 6.6).

Range in Characteristics

Soil temperature: 42 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Note: Some pedons have an A horizon.

E horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent cobbles; 15 to 55 percent gravel

Reaction: pH 5.1 to 7.3

Bw horizons

Hue: 10YR or 2.5Y

Value: 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 60 to 80 percent—0 to 20 percent cobbles; 25 to 60 percent gravel

Reaction: pH 5.1 to 7.3

BC horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 60 to 85 percent—10 to 25 percent cobbles; 50 to 60 percent gravel

Reaction: pH 5.1 to 6.6

Ethridge Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Fan, hill, stream terrace, terrace, drainageway on escarpment, swale on escarpment, drainageway on fan, swale on fan, drainageway on plain, and swale on plain

Parent material: Clayey alluvium

Slope range: 1 to 35 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Torricite Argiustolls

Typical Pedon

Ethridge clay loam, in an area of Ethridge clay loam, 4 to 8 percent slopes, in an area of rangeland, 1,200 feet south and 1,700 feet west of the northeast corner of sec. 27, T. 4 N., R. 16 E.; USGS Gibson SW topographic quadrangle (lat. 46°04'16" N.; long. 109°42'54" W.)

A—0 to 4 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, moderately sticky, moderately plastic; common very fine and fine roots; many very fine and fine pores; neutral (pH 6.6); clear smooth boundary.

Bt1—4 to 8 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; many very fine and fine pores; common distinct discontinuous brown (7.5YR 4/3) moist; clay films on faces of peds and

lining pores; neutral (pH 6.8); clear smooth boundary.

Bt2—8 to 16 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; strong medium and coarse subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine pores; many prominent continuous strong brown (7.5YR 4/6) moist; clay films on faces of peds and lining pores; neutral (pH 7.0); gradual smooth boundary.

Bt3—16 to 23 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure; very hard, firm, very sticky, very plastic; few very fine and fine roots; common very fine pores; common faint patchy brown (10YR 5/3) moist; clay films on faces of peds; slightly effervescent; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bk—23 to 42 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; common medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bky—42 to 60 inches; light brownish gray (10YR 6/2) clay loam; grayish brown (10YR 5/2) moist; weak coarse prismatic structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; common fine soft masses and threads of lime; few very fine and fine plates of gypsum; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 14 inches

Depth to the Bk horizon: 10 to 24 inches

Note: Some pedons have a Btk horizon and a BC horizon, which consists of stratified materials.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.1 to 8.4

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, clay loam, or silty clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, clay loam, or silty clay

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Sodium adsorption ratio: 1 to 5

Reaction: pH 7.4 to 9.0

Bky horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, loam, silt loam, or silty clay loam

Clay content: 25 to 40 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 2 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 5

Gypsum content: 1 to 3 percent

Reaction: pH 7.4 to 9.0

Evanston Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, hill, stream terrace, terrace, and swale on plain

Parent material: Loamy alluvium

Slope range: 0 to 35 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Evanston loam, in an area of Evanston-Reedpoint complex, 8 to 35 percent slopes, in an area of rangeland, 1,350 feet south and 300 feet east of the northwest corner of sec. 22, T. 1 S., R. 17 E.; USGS

Reed Point topographic quadrangle (lat. 45°44'11" N.; long. 109°37'24" W.)

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.3); abrupt smooth boundary.

Bt1—4 to 10 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many distinct discontinuous brown (7.5YR 4/4) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—10 to 16 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; common very fine and fine pores; few distinct discontinuous brown (7.5YR 4/4) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—16 to 31 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine pores; common fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—31 to 60 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; common fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 44 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 20 inches

Note: Some pedons have a Btk horizon.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, very fine sandy loam, clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 9.0

Fairfield Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Fan, moraine, and terrace

Parent material: Loamy alluvium

Slope range: 2 to 35 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Fairfield gravelly loam, in an area of Fairfield gravelly loam, 2 to 8 percent slopes, in an area of rangeland, 2,400 feet south and 1,300 feet west of the northeast corner of sec. 19, T. 1 S., R. 13 E.; USGS Springdale topographic quadrangle (lat. 45°44'06" N.; long. 110°09'46" W.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 20 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt—4 to 7 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; common faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and lining pores; 5 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Btk—7 to 9 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; common faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and lining pores; few fine threads of lime; 5 percent gravel; slightly effervescent; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bk1—9 to 22 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak medium and coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; common fine and medium masses of lime; 5 percent gravel; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk2—22 to 36 inches; light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, nonplastic; common very fine and fine roots; many very fine and fine pores; common carbonate coats on rock fragments; common fine soft masses of lime; 10 percent gravel; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk3—36 to 60 inches; light gray (10YR 7/2) gravelly very fine sandy loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; few fine roots; many very fine and fine pores; common carbonate coats on rock fragments; 20 percent gravel; 5 percent cobbles; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 10 inches

Depth to the calcic horizon: 7 to 10 inches

Note: Some pedons do not have a Btk horizon.

A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.6 to 8.4

Btk horizon:

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.9 to 9.0

Bk3 horizon*Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 6 to 8 dry; 5 to 7 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Very fine sandy loam, loam, clay loam, or silty clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel*Calcium carbonate equivalent:* 10 to 30 percent*Reaction:* pH 7.9 to 9.0**Fairway Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Somewhat poorly drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Flood plain, flood-plain step, and stream terrace*Parent material:* Loamy alluvium*Slope range:* 0 to 4 percent*Elevation range:* 3,750 to 6,200 feet*Mean annual precipitation:* 10 to 20 inches*Mean annual air temperature:* 39 to 46 degrees F*Frost-free period:* 70 to 130 days**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Fluvaquentic Haplustolls**Typical Pedon**

Fairway loam, in an area of Fairway loam, 0 to 2 percent slopes, in an area of hayland, 1,800 feet south and 2,150 feet east of the northwest corner of sec. 34, T. 1 N., R. 12 E.; USGS Kelly Hills topographic quadrangle (lat. 45°47'41" N.; long. 110°13'12" W.)

Ap—0 to 5 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

A2—5 to 10 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine, medium, and coarse and common very fine roots; common very fine and fine pores; slightly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

Bk1—10 to 18 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist;

moderate medium prismatic structure parting to moderate medium angular blocky; moderately hard, friable, moderately sticky, moderately plastic; few medium and coarse and common very fine and fine roots; common fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk2—18 to 25 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; few fine faint olive brown (2.5Y 4/4) moist, redox concentrations; weak coarse subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few fine and common very fine roots; common very fine and fine pores; common fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bg—25 to 44 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; common medium prominent strong brown (7.5YR 4/6) moist, redox concentrations; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few thin strata of coarser textured material; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

2Cg—44 to 60 inches; gray (10YR 6/1) sandy loam, dark gray (10YR 4/1) moist; common medium prominent strong brown (7.5YR 4/6) moist, redox concentrations; few fine faint dark greenish gray (5BG 4/1) moist, redox depletions; massive; soft, very friable, slightly sticky, nonplastic; thin strata of gravelly loamy sand and very fine sandy loam; few very fine and fine roots; 5 percent gravel; slightly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Thickness of the mollic epipedon:* 10 to 15 inches*Depth to the seasonal high water table:* 24 to 42 inches*Depth to the 2Cg horizon:* Greater than 40 inches**A or Ap horizon***Hue:* 10YR or 2.5Y*Value:* 4 or 5 dry; 2 or 3 moist*Chroma:* 1 or 2*Texture (less than 2 mm):* Loam*Clay content:* 15 to 35 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 2 to 5 percent*Reaction:* pH 6.6 to 7.8

A2 horizon*Hue:* 10YR or 2.5Y*Value:* 4 or 5 dry; 2 or 3 moist*Chroma:* 1 to 3*Texture (less than 2 mm):* Loam, clay loam, or silty clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 2 to 15 percent*Reaction:* pH 6.6 to 8.4**Bk horizons***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 3 or 4 moist*Chroma:* 2 or 3*Redox concentrations:* None to few; chroma of 3 or 4*Texture (less than 2 mm):* Loam, silt loam, or clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 5 to 15 percent*Reaction:* pH 6.6 to 8.4**Bg horizon***Hue:* 10YR, 2.5Y, or 5Y*Value:* 5 or 6 dry; 3 or 4 moist*Chroma:* 1 or 2*Redox concentrations:* Few to many; chroma of 6*Redox depletions:* None to common; chroma of 0 or 1*Texture (less than 2 mm):* Loam, silt loam, or clay loam with thin strata of sandy loam, loamy sand, or clay loam*Clay content:* 18 to 30 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 2 to 15 percent*Reaction:* pH 6.6 to 8.4**2Cg horizon***Hue:* 10YR, 2.5Y, or 5Y*Value:* 5 to 7 dry; 3 or 4 moist*Chroma:* 1 or 2*Redox concentrations:* Few to many; chroma of 6*Redox depletions:* None to common; chroma of 0 or 1*Texture (less than 2 mm):* Stratified sandy loam, loamy sand, very fine sandy loam, or sand*Clay content:* 0 to 10 percent*Content of rock fragments:* 0 to 60 percent—0 to 5 percent cobbles; 0 to 55 percent gravel*Calcium carbonate equivalent:* 0 to 15 percent*Reaction:* pH 6.6 to 8.4**Farnuf Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Fan, hill, moraine, stream terrace, terrace, fan on escarpment, swale on escarpment, fan on plain, and swale on plain*Parent material:* Loamy alluvium or loamy glaciofluvial deposits*Slope range:* 0 to 35 percent*Elevation range:* 3,900 to 6,200 feet*Mean annual precipitation:* 15 to 20 inches*Mean annual air temperature:* 39 to 45 degrees F*Frost-free period:* 70 to 115 days**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls**Typical Pedon**

Farnuf loam, in an area of Farnuf loam, 8 to 15 percent slopes, in an area of hayland, 100 feet south and 300 feet east of the northwest corner of sec. 10, T. 3 N., R. 13 E.; USGS Battleship Butte topographic quadrangle (lat. 46°01'52" N.; long. 110°06'04" W.)

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; few medium and coarse and common very fine and fine roots; many very fine and fine pores; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—5 to 9 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate coarse subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; many very fine and fine pores; few faint patchy brown (10YR 4/3) moist; clay films on faces of peds and lining pores; 10 percent gravel; neutral (pH 7.0); gradual smooth boundary.

Bt2—9 to 15 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few medium and common very fine and fine roots; many very fine and fine pores; common faint discontinuous brown (10YR 4/3) moist; clay films on faces of peds and

lining pores; 10 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

Bk1—15 to 23 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few fine, medium, and coarse roots; few fine soft masses and common threads of lime; 10 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—23 to 45 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and medium roots; common fine soft masses and threads of lime; 5 percent gravel; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk3—45 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and medium soft masses of lime; 5 percent gravel; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 25 inches

Note: Some pedons have BC and C horizons of stratified materials.

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent stones and cobbles; 0 to 15 percent gravel

Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 6 dry; 2 to 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent gravel

Reaction: pH 6.1 to 7.8

Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or silt loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Fifer Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Loamy residuum weathered from sandstone and shale or from sandstone and siltstone

Slope range: 2 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy, mixed, superactive, shallow Ustic Haplocryolls

Typical Pedon

Fifer loam, in an area of Fifer-Cheadle-Monaberg complex, 25 to 60 percent slopes, in an area of rangeland, 2,500 feet south and 1,900 feet west of the northeast corner of sec. 14, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°55'19" N.; long. 110°11'50" W.)

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky, nonplastic; many fine and medium roots; many very fine and fine pores; neutral (pH 7.2); clear smooth boundary.

A2—3 to 8 inches; grayish brown (10YR 5/2) loam; very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; slightly effervescent; neutral (pH 7.2); clear wavy boundary.

Bk—8 to 16 inches; light brownish gray (2.5Y 6/2) gravelly loam; dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable; slightly sticky and slightly

plastic; common very fine and fine roots; common very fine and fine pores; few patchy carbonate coats on undersides of rock fragments; few fine soft masses of lime; 15 percent gravel; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Cr—16 to 60 inches; calcareous soft sandstone; strongly effervescent; slightly alkaline (pH 7.8).

Range in Characteristics

Soil temperature: 39 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Cr horizon: 10 to 20 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Foolhen Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Very poorly drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Depression on flood plain

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Typic Cryaquolls

Typical Pedon

Foolhen mucky loam in an area of Foolhen, stony-Tibkey, bouldery complex, 0 to 8 percent slopes, in an area of wet meadow, 2,225 feet south and 1,100 feet west of the northeast corner of sec. 6, T. 3 N., R. 3 W.; Jefferson County, Montana.

Oe—0 to 1 inch; mat of partially decomposed organic matter and roots.

A1—1 to 5 inches; black (5Y 2.5/2) mucky loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; common medium and many very fine and fine roots; 4 percent rounded cobbles; 10 percent rounded gravel; neutral (pH 6.8); clear wavy boundary.

A2—5 to 14 inches; black (5Y 2.5/2) mucky silt loam, black (10YR 2/1) moist; few distinct reddish brown (5YR 5/4) redox concentrations; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine pores; 5 percent rounded cobbles; 20 percent rounded gravel; neutral (pH 6.8); gradual wavy boundary.

Bw—14 to 22 inches; pale brown (10YR 6/3) gravelly sandy clay loam, dark brown (10YR 3/3) moist; many distinct yellowish red (5YR 5/6) redox concentrations; common faint very dark gray (5Y 3/1) redox depletions; moderate medium subangular blocky structure; hard, friable, moderately sticky, slightly plastic; many very fine and fine roots; few very fine pores; 5 percent rounded cobbles; 20 percent rounded gravel; neutral (pH 7.0); gradual wavy boundary.

Cg1—22 to 33 inches; brown (10YR 5/3) gravelly sandy clay loam, brown (10YR 4/3) moist; many distinct yellowish red (5YR 5/6) redox concentrations; common faint very dark gray (5Y 3/1) redox depletions; weak medium subangular blocky structure; hard, friable, moderately sticky, slightly plastic; many very fine and fine roots; few very fine pores; 5 percent rounded cobbles; 20 percent rounded gravel; neutral (pH 7.2); gradual wavy boundary.

Cg2—33 to 45 inches; yellowish brown (10YR 5/4) cobbly sandy clay loam, brown (10YR 4/3) moist; many distinct yellowish red (5YR 5/6) redox concentrations; few faint very dark gray (5Y 3/1) redox depletions; weak coarse subangular blocky structure; slightly hard, friable, moderately sticky,

slightly plastic; many very fine and fine roots; few very fine pores; 15 percent rounded cobbles; 15 percent rounded gravel; neutral (pH 7.2); gradual irregular boundary.

Cg3—45 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; many distinct yellowish red (5YR 5/6) redox concentrations; few faint very dark gray (5Y 3/1) redox depletions; massive; slightly hard, friable, moderately sticky, slightly plastic; common very fine and fine roots; few very fine pores; 10 percent rounded cobbles; 35 percent rounded gravel; neutral (pH 7.2).

Range in Characteristics

Soil temperature: 36 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 19 inches

Depth to the seasonal high water table: Ponded to 12 inches

Surface stones: 0.0 to 0.1 percent

A horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 2, 2.5, or 3 dry

Chroma: 1 or 2

Texture (less than 2 mm): Loam, mucky loam, mucky silt loam, or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 10YR, 2.5Y, or 5Y

Texture (less than 2 mm): Sandy clay loam, loam, or sandy loam

Clay content: 18 to 30 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Cg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 or 5 moist; 5 to dry

Texture (less than 2 mm): Loam, sandy clay loam, or sandy loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 50 percent—0 to 15 percent cobbles; 0 to 35 percent gravel

Reaction: pH 5.6 to 7.3

Frenchcreek Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Stream terrace

Parent material: Gravelly alluvium

Slope range: 2 to 4 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Frenchcreek very gravelly loam, 2,000 feet north and 800 feet east of the southwest corner of sec. 29, T. 13 N., R. 3 W.; Lewis and Clark County, Montana.

A—0 to 5 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/3) moist; moderate very thin platy structure parting to moderate very fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; 55 percent angular gravel; slightly acid (pH 6.1); clear smooth boundary.

Bw1—5 to 12 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine roots; many very fine tubular and interstitial pores; 60 percent angular gravel; slightly acid (pH 6.2); gradual smooth boundary.

Bw2—12 to 26 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, dark brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, slightly sticky, nonplastic; common very fine roots; 70 percent angular gravel; slightly acid (pH 6.4); gradual smooth boundary.

C1—26 to 36 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, dark brown (10YR 4/3) moist; single grain; loose, slightly sticky; nonplastic; few very fine roots; 70 percent angular gravel; neutral (pH 6.6); gradual smooth boundary.

C2—36 to 60 inches; very pale brown (10YR 7/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, moderately sticky and slightly plastic; 70 percent angular gravel; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 7 to 15 inches; may or may not include part of the Bw horizon

A horizon*Hue:* 5YR, 7.5R, or 10YR*Value:* 4 or 5 dry, 3 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Loam*Clay content:* 15 to 25 percent*Content of rock fragments:* 15 to 70 percent—0 to 15 percent stones and cobbles; 15 to 55 percent angular gravel*Reaction:* pH 6.1 to 7.8**Bw1 horizon***Hue:* 5YR, 7.5YR, or 10YR*Value:* 4 to 6 dry; 3 or 4 moist*Chroma:* 3 or 4*Texture (less than 2 mm):* Loam or sandy loam*Clay content:* 15 to 25 percent*Content of rock fragments:* 30 to 80 percent—0 to 15 percent stones and cobbles; 30 to 65 percent angular gravel*Reaction:* pH 6.1 to 7.8**Bw2 horizon***Hue:* 5YR, 7.5YR, or 10YR*Value:* 5 to 7 dry; 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Sandy loam or loam*Clay content:* 10 to 20 percent*Content of rock fragments:* 35 to 75 percent—0 to 5 percent cobbles; 35 to 70 percent angular gravel*Reaction:* pH 6.1 to 7.8**C1 horizon***Hue:* 5YR, 7.5Y, or 10YR*Value:* 5 to 7 dry; 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Loamy sand or sandy loam*Clay content:* 5 to 15 percent*Content of rock fragments:* 50 to 80 percent—0 to 5 percent cobbles; 50 to 75 percent angular gravel*Reaction:* pH 6.1 to 7.8**C2 horizon***Hue:* 5YR, 7.5YR, or 10YR*Value:* 6 or 7 dry, 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Loam or sandy loam*Clay content:* 10 to 20 percent*Content of rock fragments:* 60 to 80 percent—0 to 5 percent angular cobbles; 60 to 75 percent angular gravel*Reaction:* pH 6.6 to 7.8**Gerdrum Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Well drained*Permeability:* Very slow (less than 0.06 inch/hour)*Landform:* Plain, stream terrace, and depression on terrace*Parent material:* Clayey alluvium*Slope range:* 0 to 8 percent*Elevation range:* 3,750 to 5,600 feet*Mean annual precipitation:* 10 to 19 inches*Mean annual air temperature:* 39 to 45 degrees F*Frost-free period:* 95 to 125 days**Taxonomic Class:** Fine, smectitic, frigid Torricite Natrustalfs**Typical Pedon**

Gerdrum clay loam, in an area of Gerdrum-Creed complex, 0 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 2,600 feet east of the southwest corner of sec. 12, T. 3 N., R. 18 E.; USGS Locomotive Butte SW topographic quadrangle (lat. 46°01'27" N.; long. 109°26'02" W.)

E—0 to 3 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak thin and medium platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); abrupt smooth boundary.

Btn1—3 to 8 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium columnar structure parting to strong medium subangular and angular blocky; very hard, firm, very sticky, very plastic; many very fine and fine roots compressed between ped faces; few very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; slightly alkaline (pH 7.6); clear smooth boundary.

Btn2—8 to 13 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse subangular and angular blocky structure; very hard, firm, very sticky, very plastic; common very fine and fine roots compressed between ped faces; few very fine and fine pores; many distinct continuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; slightly alkaline (pH 7.8); abrupt smooth boundary.

Btnk—13 to 18 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist;

moderate coarse prismatic structure parting to moderate medium subangular and angular blocky; very hard, firm, very sticky, very plastic; few fine roots compressed between ped faces; few very fine and fine pores; few faint dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; few fine and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bknyz1—18 to 28 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; very hard, firm, very sticky, very plastic; few fine roots; few very fine and fine pores; common fine and medium soft masses of gypsum and other salts; common fine and medium soft masses of lime; strongly effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

Bknyz2—28 to 41 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak medium and coarse prismatic structure; very hard, firm, very sticky, very plastic; few very fine and fine pores; many medium and coarse soft masses and nests of gypsum and other salts; common fine and medium soft masses and threads of lime; strongly effervescent; strongly alkaline (pH 8.8); gradual smooth boundary.

Bknyz3—41 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; very hard, firm, very sticky, very plastic; common medium soft masses and nests of gypsum and other salts; few fine and medium soft masses of lime; strongly effervescent; strongly alkaline (pH 8.8).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the secondary carbonates horizon: 10 to 24 inches

Depth to gypsum: 10 to 28 inches

Note: Some pedons have an A horizon.

E horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Btn horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, silty clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent gravel

Structure: Fine to coarse columnar and medium or coarse blocky

Hardness: Extremely or very hard when dry

Electrical conductivity: 1 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 20

Reaction: pH 7.4 to 9.0

Btnk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay, silty clay, clay loam, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 1 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 20

Reaction: pH 7.4 to 9.0

Bknyz horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, silty clay, clay loam, or sandy clay loam

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 10 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.0

Gilispie Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Clayey residuum weathered from sandstone

Slope range: 2 to 35 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy, mixed, superactive Lithic Argicryolls

Typical Pedon

Gilispie gravelly loam, in an area of Cheadle-Lymanson-Gilispie complex, 15 to 35 percent slopes, in an area of rangeland, 3,500 feet north and 1,800 feet east of the southwest corner of sec. 36, T. 2 N., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°37'15" N.; long. 110°11'23" W.)

A—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 22 percent channers; slightly acid (pH 6.4); abrupt smooth boundary.

Bt1—7 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; many distinct continuous dark yellowish brown (10YR 4/6) moist; clay films on faces of peds and lining pores; 5 percent gravel; 5 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt2—13 to 16 inches; light brownish gray (10YR 6/2) cobbly clay, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; common distinct patchy dark yellowish brown (10YR 4/6) moist; clay films on faces of peds and rock fragments; 10 percent gravel; 15 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.

R—16 inches; hard sandstone bedrock; noneffervescent.

Range in Characteristics

Soil temperature: 44 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 5 to 15 inches

Depth to bedrock: 10 to 20 inches

Note: The weighted average of the clay content of the Bt horizon does not exceed 35 percent.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 20 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 6 dry; 2 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, clay loam, or loam

Clay content: 20 to 45 percent

Content of rock fragments: 15 to 35 percent—5 to 15 percent stones and cobbles; 10 to 20 percent gravel

Reaction: pH 6.6 to 7.3

Greybear Series

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Swale on plain

Parent material: Clayey alluvium over clayey residuum weathered from shale

Slope range: 2 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Aridic Haplustolls

Typical Pedon

Greybear clay loam, in an area of Greybear-Rentsac complex, 2 to 15 percent slopes, in an area of rangeland, 1,900 feet south and 850 feet west of the northeast corner of sec. 27, T. 1 N., R. 13 E.; USGS Carney topographic quadrangle (lat. 45°48'31" N.; long. 110°05'15" W.)

A—0 to 2 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; weak medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine to medium roots; many very fine and fine pores; slightly effervescent; neutral; (pH 7.2); abrupt smooth boundary.

Bw—2 to 8 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak fine and medium

subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; many very fine and fine pores; strongly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk1—8 to 22 inches; reddish gray (5YR 5/2) clay loam, dark reddish gray (5YR 4/2) moist; strong medium and coarse prismatic structure; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; common fine and medium masses and threads of lime; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—22 to 35 inches; dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 3/2) moist; moderate medium angular blocky structure; very hard, friable, very sticky, very plastic; few very fine and fine roots; common very fine and fine pores; common fine soft masses and threads of lime; violently effervescent; strongly alkaline (pH 8.6); clear smooth boundary.

Bk3—35 to 56 inches; dark reddish gray (5YR 4/2) gravelly clay loam, dark reddish brown (5YR 3/2) moist; weak medium angular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; few very fine and fine pores; few fine soft masses of lime; 15 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—56 to 60 inches; dark gray (5YR 4/1) stratified shale and siltstone bedrock, very dark gray (5YR 3/1) moist; slightly effervescent.

Range in Characteristics

Soil temperature: 41 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 8 to 20 inches

Depth to the Cr horizon: 40 to 60 inches

A horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 dry; 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay loam, or silty clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 7.4 to 9.0

Bk1 and Bk2 horizons

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 to 6 dry; 3 to 5 moist; values of 5 dry and 3 moist with low chroma are lithochromatic.

Chroma: 2 or 3;

Texture (less than 2 mm): Clay loam, silty clay loam, or silty clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bk3 horizon

Hue: 2.5YR, 5YR, or 7.5YR

Value: 4 to 6 dry; 3 to 5 moist; values of 5 dry and 3 moist with low chroma are lithochromatic.

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay loam, or silty clay

Clay content: 35 to 45 percent

Content of rock fragments: 5 to 25 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Havre Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Flood plain

Parent material: Loamy alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 130 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Aridic Ustifluvents

Typical Pedon

Havre loam, in an area of Havre loam, 0 to 2 percent slopes, 1,400 feet north and 3,000 feet east of the southwest corner of sec. 11, T. 2 S., R. 19 E.; Stillwater County, Montana.

Ap—0 to 6 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak thin platy structure parting to weak fine granular; soft, friable, nonsticky, nonplastic; few very fine and fine roots and pores; strongly effervescent;

moderately alkaline (pH 7.9); clear wavy boundary.

- C1—6 to 9 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak fine angular blocky structure parting to weak fine granular; soft, friable, nonsticky, nonplastic; few very fine roots and pores; strongly effervescent; moderately alkaline (pH 7.9); clear wavy boundary.
- C2—9 to 48 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; soft, friable, nonsticky, nonplastic; few very fine roots and pores; strongly effervescent; strongly alkaline (pH 8.4); clear smooth boundary.
- C3—48 to 60 inches; light gray (10YR 7/1) stratified silt loam, fine sandy loam, and clay, gray (10YR 5/1) moist; massive; soft, friable, moderately sticky, moderately plastic; 5 percent lime-coated gravel; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Note: Some pedons have between 15 and 60 percent coarse fragments below a depth of 40 inches.

Ap horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Calcium carbonate equivalent: 1 to 10 percent

Effervescence: None to strongly

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 0 to 4

Reaction: pH 6.1 to 8.4

C1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silt loam, clay loam, or sandy clay loam, which consist of strata of silt loam, fine sandy loam, very fine sandy loam, silty clay loam, and clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 1 to 10 percent

Effervescence: Slight or strongly

Electrical conductivity: 0 to 16 mmhos/cm

Reaction: pH 7.4 to 9.0

C2 and C3 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silt loam, clay loam, or sandy clay loam, which consist of strata of silt loam, fine sandy loam, very fine sandy loam, silty clay loam, and clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 1 to 10 percent

Effervescence: Slight or strongly

Electrical conductivity: 0 to 16 mmhos/cm

Reaction: pH 7.4 to 9.0

Hinterland Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Hill, knoll on plain, structural bench on plain, and swale on plain

Parent material: Residium weathered from sandstone

Slope range: 0 to 35 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Clayey, smectitic, frigid Aridic Lithic Argiustolls

Typical Pedon

Hinterland clay loam, in an area of Hinterland clay loam, 0 to 8 percent slopes, in an area of cropland, 1,500 feet south and 1,000 feet west of the northeast corner of sec. 1, T. 2 N., R. 17 E.; USGS Stephens Hill NE topographic quadrangle (lat. 45°57'18" N.; long. 109°33'08" W.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine pores; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bt1—7 to 10 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium angular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few fine and medium and common very fine roots; common very fine and fine pores; common faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; slightly alkaline (pH 7.4); clear smooth boundary.

Bt2—10 to 13 inches; yellowish brown (10YR 5/4) channery clay loam, brown (10YR 4/3) moist;

moderate medium and coarse angular blocky structure parting to moderate fine subangular blocky; moderately hard, friable, very sticky, very plastic; common very fine roots; common very fine pores; common distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and rock fragments; 25 percent channers; slightly alkaline (pH 7.4); abrupt smooth boundary.

R—13 inches; hard fractured sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam or silty clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel or channers

Reaction: pH 6.6 to 7.8

Klayent Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Flood plain

Parent material: Clayey alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 85 to 125 days

Taxonomic Class: Fine, mixed, superactive, calcareous, frigid Fluvaquentic Endoaquolls

Typical Pedon

Klayent clay loam, 1,900 feet south and 2,200 feet west of the northeast corner of sec. 10, T. 18 N., R. 22 E.; Fergus County, Montana.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; weak thin and medium platy structure; hard, friable, moderately sticky, moderately plastic; few coarse and many fine, very fine, and medium roots; slightly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

Bw—5 to 14 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, moderately sticky, moderately plastic; few coarse, common medium, and many very fine and fine roots; common medium and many very fine and fine pores; 1 percent gravel; few fine masses of gypsum and other salts; slightly effervescent; moderately alkaline (pH 8.4); clear irregular boundary.

Bk_{yz}—14 to 23 inches; very dark gray (10YR 3/1) clay, light brownish gray (2.5Y 6/2) dry; organic coatings on faces of peds are light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) dry; few fine distinct very pale brown (10YR 7/4) redox concentrations; weak coarse prismatic structure parting to weak fine and medium subangular blocky; very hard, friable, moderately sticky, moderately plastic; few medium and many very fine and fine roots; common medium and many very fine and fine pores; many fine, medium, and coarse distinct masses of lime; many fine, medium, and coarse distinct masses of gypsum and other salts; strongly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.

By_{zg}—23 to 30 inches; gray (5Y 5/1) clay, light gray (5Y 6/1) dry; common fine distinct very pale brown (10YR 7/4) redox concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, firm, very

sticky, moderately plastic; few medium and common very fine and fine roots; common medium and many very fine and fine pores; many medium and coarse distinct masses of gypsum and other salts; disseminated lime; slightly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.

Cyzg1—30 to 43 inches; gray (5Y 5/1) clay loam, stratified with thin lenses of light clay, light gray (5Y 6/1) dry; many fine and medium distinct brownish yellow (10YR 6/8) redox concentrations; massive; extremely hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; common very fine and fine pores; many fine, medium, and coarse distinct masses of gypsum and other salts; disseminated lime; strongly effervescent; strongly alkaline (pH 8.6); gradual wavy boundary.

Cyzg2—43 to 67 inches; greenish gray (5GY 6/1) sandy clay loam stratified with thin lenses of loam and sandy clay, greenish gray (5GY 6/1) dry; many medium and coarse distinct brownish yellow (10YR 6/8) and olive brown (2.5Y 4/4) redox concentrations; massive; extremely hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine and fine pores; common fine and medium and few coarse masses of gypsum and other salts; disseminated lime; strongly effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 44 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 16 inches

Depth to lime: 10 to 16 inches

Depth to the Bk horizon: 12 to 20 inches

Depth to the seasonal high water table: 12 to 24 inches

Notes: Few threads of lime and masses of salts may not be present in the Bw horizon. Some pedons have a Bkyzg or a Ckyzg horizon.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Clay loam

Clay content: 27 to 40 percent

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 1 or 2

Texture (less than 2 mm): Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 7.9 to 9.0

Bkyz horizon

Hue: 10YR, 2.5Y, or 5Y matrix; 10YR or 2.5Y redox concentrations

Value: 4 to 6 matrix, 6 to 8 redox concentrations dry; 3 or 4 matrix, 6 or 7 redox concentrations moist

Chroma: 1 or 2 matrix; 2, 4, 6, or 8 redox concentrations

Texture (less than 2 mm): Silty clay loam, clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Gypsum content: 0 to 1 percent

Electrical conductivity: 2 to 8 mmhos/cm

Reaction: pH 7.9 to 9.0

Byzg horizon

Hue: 2.5Y, 5Y, or 5GY matrix; 10YR or 2.5Y redox concentrations

Value: 6 or 7 matrix, 5 or 7 redox concentrations dry; 4 to 6 matrix, 4 or 7 redox concentrations moist

Chroma: 1 or 2 matrix, 4, 6, or 8 redox concentrations

Redox concentrations: Common or many; faint to prominent

Texture (less than 2 mm): Clay loam, silty clay loam, clay, or sandy clay loam

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Gypsum content: 1 to 3 percent

Electrical conductivity: 2 to 8 mmhos/cm

Reaction: pH 7.9 to 9.0

Cyzg horizons

Hue: 2.5Y, 5Y, or 5GY matrix; 10YR or 2.5Y redox concentrations

Value: 6 or 7 matrix, 5 or 6 redox concentrations dry; 4 to 6 matrix, 4 or 5 redox concentrations moist

Chroma: 1 or 2 matrix; 4, 6, or 8 redox concentrations

Redox concentrations: Common or many; faint to prominent

Texture (less than 2 mm): Sandy clay loam with strata of sandy clay

Clay content: 30 to 45 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Gypsum content: 1 to 3 percent
Electrical conductivity: 2 to 4 mmhos/cm
Reaction: pH 7.9 to 9.0

Knep Family

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Mountain
Parent material: Loamy alluvium or colluvium
Slope range: 8 to 15 percent
Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 35 to 40 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
 Ustic Eutrocrypts

Typical Pedon

Knep loam, in an area of Knep family-Warwood loams, 4 to 15 percent slopes, in an area of coniferous forest, 1,400 feet south and 1,800 feet west of the northeast corner of sec. 15, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°55'31" N.; long. 110°13'02" W.)

- Oi—0 to 2 inches; partially decomposed forest litter.
 A—2 to 6 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thin and medium platy structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; many very fine to medium pores; slightly alkaline (pH 7.4); abrupt smooth boundary.
 Bw—6 to 14 inches; light gray (2.5Y 7/2) loam, olive brown (2.5Y 4/4) moist; moderate fine and medium prismatic structure; moderately hard, firm, slightly sticky, slightly plastic; common very fine to medium roots; slightly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
 Bk—14 to 62 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse prismatic structure; moderately hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; few fine threads and masses of lime; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 38 to 42 degrees F
Depth to the Bk horizon: 8 to 15 inches

A horizon

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 or 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Knep Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Hill and mountain
Parent material: Loamy residuum weathered from sandstone and siltstone
Slope range: 15 to 45 percent
Elevation range: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 36 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
 Ustic Eutrocrypts

Typical Pedon

Knep channery loam, in an area of Fifer-Knep complex, 15 to 45 percent slopes, in an area of rangeland, 2,200 feet north and 300 feet east of the

southwest corner of sec. 15, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°55'16" N.; long. 110°13'45" W.)

A—0 to 7 inches; light brownish gray (2.5Y 6/2) channery loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine granular structure; soft, friable, nonsticky, nonplastic; common very fine to medium roots; many fine pores; strongly effervescent; 30 percent channers; slightly alkaline (pH 7.6); clear smooth boundary.

Bw—7 to 17 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common very fine and fine pores; strongly effervescent; 10 percent channers; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bk—17 to 25 inches; light brownish gray (2.5Y 6/2) channery loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; few soft masses of lime; strongly effervescent; 20 percent channers; moderately alkaline (pH 8.0); clear smooth boundary.

Cr—25 to 60 inches; calcareous interbedded shale and siltstone.

Range in Characteristics

Soil temperature: 37 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to bedrock: 20 to 40 inches

Depth to the Bk horizon: 7 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 5 to 35 percent gravel or channers

Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, silt loam, or silty clay loam

Clay content: 24 to 32 percent

Content of rock fragments: 5 to 25 percent gravel or channers

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, silty clay loam, or very fine sandy loam

Clay content: 14 to 35 percent

Content of rock fragments: 5 to 25 percent gravel or channers

Reaction: pH 7.4 to 8.4

Kobase Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Hill, stream terrace, and swale on plain

Parent material: Clayey alluvium weathered from shale and siltstone

Slope range: 2 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Torricic Haplustepts

Typical Pedon

Kobase clay loam, in an area of Kobase clay loam, 2 to 8 percent slopes, in an area of rangeland, 200 feet north and 400 feet east of the southwest corner of sec. 8, T. 3 N., R. 18 E.; USGS Gibson topographic quadrangle (lat. 46°01'09" N.; long. 109°31'19" W.)

A—0 to 7 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bw—7 to 12 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and common very fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk1—12 to 19 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few fine roots; common very fine and fine pores; many fine threads and soft masses of lime; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—19 to 35 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; moderately hard, friable, moderately sticky, moderately plastic; few fine roots; few very fine and fine pores; common fine threads and soft masses of lime; violently effervescent; strongly alkaline (pH 8.6); clear smooth boundary.

Bky—35 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; moderately hard, firm, moderately sticky, moderately plastic; few fine threads and soft masses of lime; few fine platelike gypsum crystals; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 12 to 17 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 40 percent

Calcium carbonate equivalent: 0 to 5 percent

Content of rock fragments: 0 to 5 percent gravel

Sodium adsorption ratio: 1 to 4

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Sodium adsorption ratio: 1 to 4

Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Sodium adsorption ratio: 5 to 10

Reaction: pH 7.4 to 9.0

Bk2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Sodium adsorption ratio: 5 to 10

Reaction: pH 7.9 to 9.0

Bky horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 8 to 13

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.0

Korchea Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Flood plain, flood-plain step, stream terrace, and drainageway on plain

Parent material: Loamy alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 130 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Mollic Ustifluvents

Typical Pedon

Korchea loam, in an area of Korchea loam, 0 to 2 percent slopes, in an area of cropland, 1,400 feet north and 1,800 feet west of the southeast corner of

sec. 29, T. 3 N., R. 15 E.; USGS Otter Creek School topographic quadrangle (lat. 45°58'38" N.; long. 109°52'57" W.)

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; common very fine roots; common very fine pores; slightly effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

C1—5 to 12 inches; light brownish gray (2.5Y 6/2) stratified loam, dark grayish brown (2.5Y 4/2) moist; moderate medium angular blocky structure; moderately hard, firm, slightly sticky, slightly plastic; common very fine roots; common very fine pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt wavy boundary.

C2—12 to 22 inches; light brownish gray (2.5Y 6/2) stratified loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; common very fine roots; common very fine pores; strongly effervescent; slightly alkaline (pH 7.8); abrupt smooth boundary.

C3—22 to 34 inches; light brownish gray (2.5Y 6/2) stratified very fine sandy loam and loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; many very fine pores; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

C4—34 to 60 inches; grayish brown (2.5Y 5/2) stratified loam and very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 5 to 15 inches

Notes: The C horizons are stratified with finer and coarser materials.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 6.6 to 8.4

C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Stratified loam, fine sandy loam, silt loam, silty clay loam, sandy loam, or very fine sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 9.0

Kremlin Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, stream terrace, terrace, swale on fan, and swale on plain

Parent material: Loamy alluvium

Slope range: 0 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Kremlin loam, 1,000 feet south and 1,700 feet east of the northwest corner of sec. 23, T. 30 N., R. 10 E.; Hill County, Montana.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; neutral (pH 6.8); abrupt smooth boundary.

A2—6 to 11 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, moderately sticky, moderately plastic; many very fine roots; many very fine pores; neutral (pH 6.8); clear smooth boundary.

Bw—11 to 19 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine pores; neutral (pH 7.0); clear smooth boundary.

Bk1—19 to 31 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine pores; few fine masses of lime; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—31 to 60 inches; light yellowish brown (2.5Y 6/4) loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine roots; common very fine pores; common fine masses of lime; violently effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 10 to 24 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 32 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.1 to 8.4

A2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 32 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 32 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.0 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 32 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bk2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Stratified loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

Laceycreek Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Drainageway on escarpment, swale on escarpment, drainageway on hill, swale on hill, drainageway on stream terrace, and swale on stream terrace

Parent material: Loamy alluvium

Slope range: 2 to 45 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Pachic Argiustolls

Typical Pedon

Laceycreek loam, in an area of Castner-Laceycreek-Bowery complex, 25 to 60 percent slopes, in an area of rangeland, 1,200 feet south and 1,000 feet east of the northwest corner of sec. 24, T. 2 S., R. 13 E.; USGS McLeod topographic quadrangle (lat. 45°39'04" N.; long. 110°04'11" W.)

A1—0 to 4 inches; very dark gray (10YR 3/1) sandy loam, black (10YR 2/1) moist; moderate fine and medium granular structure; soft, very friable,

slightly sticky, slightly plastic; common medium and many very fine and fine roots; common very fine and fine pores; neutral (pH 7.0); clear wavy boundary.

A2—4 to 12 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; neutral (pH 7.0); clear wavy boundary.

A3—12 to 23 inches; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; neutral (pH 7.0); gradual wavy boundary.

Bt1—23 to 32 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; few very fine roots; few very fine and fine pores; few distinct discontinuous dark grayish brown (10YR 4/3) moist; clay films on faces of peds and lining pores; neutral (pH 7.2); clear wavy boundary.

Bt2—32 to 58 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium and coarse subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; few very fine roots; few very fine and fine pores; common distinct discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds and lining pores; 20 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

2BC—58 to 60 inches; yellowish brown (10YR 5/4) very channery sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; 35 percent channers; 10 percent flagstones; slightly alkaline (pH 7.4).

Range in Characteristics

Soil temperature: 40 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 16 to 60 inches

Depth to the BC horizon: 40 inches or more

Note: Some pedons do not have a 2BC horizon.

A1 horizon

Hue: 10YR, 2.5Y, or N

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 0 or 1

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 24 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.1 to 7.3

A2 and A3 horizon

Hue: 10YR, 2.5Y, or N

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or very fine sandy loam

Clay content: 15 to 24 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 24 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent gravel

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.3

2BC horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 5 to 20 percent

Content of rock fragments: 15 to 60 percent—0 to 10 percent flagstones or cobbles; 15 to 50 percent gravel or channers

Calcium carbonate equivalent: 0 to 2 percent

Reaction: pH 6.6 to 7.3

Lallie Family

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Flood plain and depression on flood plain

Parent material: Clayey alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 125 days

Taxonomic Class: Fine, smectitic, calcareous, frigid
Vertic Fluvaquents

Typical Pedon

Lallie silty clay loam, in an area of grassland, 150 feet south and 600 feet west of the northeast corner sec. 35, T. 21 N., R. 1 W.; Cascade County, Montana.

A—0 to 2 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; extremely hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; slightly effervescent; strongly alkaline (pH 8.5); gradual wavy boundary.

Cg1—2 to 12 inches; gray (N 6/) silty clay, gray, (N 5/) moist; common fine to medium prominent dark yellowish brown (10YR 4/4) moist, mottles; strong very fine subangular blocky structure; extremely hard, firm, moderately sticky, very plastic; common very fine and fine roots; many very fine and fine pores; many very fine masses of gypsum; strongly effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.

Cg2—12 to 45 inches; light gray (N 7/) silty clay, gray (N 5/) and greenish gray (5GY 6/1) moist; many fine to coarse prominent olive brown (2.5Y 4/4) moist, mottles; massive; extremely hard, firm, moderately sticky, very plastic; common very fine and fine roots; many very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

Cg3—45 to 50 inches; gray (N 6/) clay loam, gray (N 5/) moist; few fine and medium distinct dark gray (N 1/) moist, mottles; massive; extremely hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.

2Cg4—50 to 60 inches; light gray (5Y 6/1) very gravelly sand, dark gray (5Y 4/1) moist; single grain; loose, nonsticky, nonplastic; strongly effervescent; 40 percent gravel; 5 percent cobbles; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 36 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the seasonal high water table: 0 to 12 inches

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 2 to 4 moist; 3 to 6 dry

Chroma: 1 or 2

Texture (less than 2 mm): Silty clay

Clay content: 40 to 60 percent

Calcium carbonate equivalent: 5 to 10 percent

Gypsum content: 0 to 1 percent

Electrical conductivity: 0 to 8 mmhos/cm

Reaction: pH 6.6 to 9.0

Cg horizons

Hue: 2.5Y, 5Y, or N

Value: 3 to 6 moist; 4 to 8 dry

Chroma: 0 to 2

Texture (less than 2 mm): Silty clay loam or silty clay with strata of silt loam

Clay content: 35 to 60 percent

Calcium carbonate equivalent: 5 to 10 percent

Gypsum content: 0 to 5 percent

Electrical conductivity: 0 to 8 mmhos/cm

Reaction: pH 7.4 to 9.0

2Cg horizon

Hue: 2.5Y or 5Y

Value: 4 to 6 moist; 5 to 8 dry

Chroma: 1 or 2

Texture (less than 2 mm): Sand, coarse sand, or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 55 percent—0 to 10 percent cobbles; 35 to 45 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

Lap Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill and mountain

Parent material: Residuum weathered from limestone

Slope range: 8 to 70 percent

Elevation range: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Mean annual air temperature: 39 to 42 degrees F

Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid
Lithic Calciustolls

Typical Pedon

Lap channery loam, in an area of Lap-Winspect-Rock outcrop complex, 8 to 35 percent slopes, in an area of rangeland, 300 feet north and 600 feet west of the southeast corner of sec. 23, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°33'12" N.; long. 110°11'58" W.)

A1—0 to 4 inches; dark grayish brown (10YR 4/2) channery loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 20 percent angular channers; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

A2—4 to 8 inches; brown (10YR 4/3) very channery loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 35 percent channers; 5 percent cobbles; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

Bk—8 to 14 inches; light brownish gray (10YR 6/2) very channery loam, grayish brown (10YR 5/2) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine pores; 40 percent channers; 15 percent cobbles; lime casts on undersides of channers and cobbles; violently effervescent; strongly alkaline (pH 8.6); abrupt smooth boundary.

R—14 inches; hard limestone bedrock with some cracks.

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to bedrock: 10 to 20 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 10 to 60 percent—0 to 20 percent stones, flagstones, or cobbles; 10 to 40 percent gravel or channers

Calcium carbonate equivalent: 0 to 15 percent in the less than 2-mm particle size class and more than 40 percent in the less than 20-mm particle size class

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 70 percent—0 to 30 percent stones, flagstones, or cobbles; 35 to 55 percent gravel or channers

Calcium carbonate equivalent: 40 to 60 percent in the less than 2-mm particle size class and more than 40 percent in the less than 20-mm particle size class.

Reaction: pH 7.9 to 8.4

Larry Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Flood plain and flood-plain step

Parent material: Loamy alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 130 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Endoaquolls

Typical Pedon

Larry clay loam, in an area of Larry clay loam, 0 to 2 percent slopes, in an area of tame pasture, 700 feet north and 1,800 feet east of the southwest corner of sec. 29, T. 2 N., R. 14 E.; USGS Grosfield Ranch topographic quadrangle (lat. 45°53'19" N.; long. 110°00'50" W.)

A—0 to 7 inches; gray (5Y 5/1) clay loam, very dark gray (5Y 3/1) moist; moderate very fine granular structure; extremely hard, friable, moderately sticky, moderately plastic; few medium and coarse and many very fine and fine roots; common very fine and fine pores; slightly alkaline (pH 7.4); clear wavy boundary.

Bg—7 to 15 inches; gray (5Y 6/1) clay loam, gray (5Y 5/1) moist; few fine prominent yellowish

brown (10YR 5/4) moist, redox concentrations; weak fine granular structure; extremely hard, friable, moderately sticky, moderately plastic; few fine and medium and common very fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.

Cg1—15 to 31 inches; light gray (5Y 7/1) clay loam, gray (5Y 6/1) moist; few fine prominent yellowish brown (10YR 5/4) moist, redox concentrations; massive; extremely hard, friable, moderately sticky, moderately plastic; few very fine to medium roots; common very fine and fine pores; disseminated lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Cg2—31 to 36 inches; light olive gray (5Y 6/2) gravelly loam, olive gray (5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/4) moist, redox concentrations; massive; extremely hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine and fine pores; 15 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Cg3—36 to 44 inches; light olive gray (5Y 6/2) gravelly sandy loam, olive gray (5Y 5/2) moist; massive; extremely hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine and fine pores; 20 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Cg4—44 to 60 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 4/2) moist; few medium prominent gray (N 6/) moist, redox depletions; massive; extremely hard, extremely firm, very sticky, very plastic; few very fine pores; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 42 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 18 inches

Depth to the seasonal high water table: +6 to 24 inches

Note: Some pedons do not have a Cg4 horizon.

A horizon

Hue: 5Y or N

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 0 or 1

Texture (less than 2 mm): Clay loam or loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 7.8

Bg horizon

Hue: 5Y or N

Value: 4 to 6 dry; 3 to 6 moist

Chroma: 0 to 2

Redox concentrations: None to common; chroma of 4 or 6

Texture (less than 2 mm): Clay loam, silt loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

Cg1 horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 5 to dry; 5 or 6 moist

Chroma: 0 to 2

Redox concentrations: Few to many; chroma of 4 or 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Clay loam, silt loam, or loam with strata of sandy loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

Cg2 and Cg3 horizons

Hue: 5Y, 2.5Y, or N

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 0 to 2

Redox concentrations: None to many; chroma of 4 or 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Clay loam, silt loam, or loam with strata of sandy loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

Cg4 horizon

Hue: 5Y, 2.5Y, or N

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 0 to 2

Redox concentrations: None to many; chroma of 4 or 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Clay loam or clay

Clay content: 28 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 1 to 15 percent
Reaction: pH 7.4 to 8.4

Ledger Family

Depth class: Very deep (greater than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Slow (0.06 to 0.20 inch/hour)
Landform: Flood plain
Parent material: Clayey alluvium
Slope range: 0 to 4 percent
Elevation range: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Fine, mixed, superactive,
 calcareous, frigid Oxyaquic Ustifluvents

Typical Pedon

Ledger clay loam, in an area of Ledger family clay loam, 1 to 4 percent slopes, in an area of rangeland, 1,500 feet north and 1,300 feet west of the southeast corner of sec. 18, T. 4 N., R. 16 E.; USGS Upper Glasston Lake topographic quadrangle (lat. 46°05'35" N.; long. 109°46'34" W.)

Az—0 to 6 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; moderately hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; few very fine masses of salt; moderately alkaline (pH 8.2); abrupt smooth boundary.

ACz—6 to 11 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong fine and medium angular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; few very fine masses of salt; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Cz1—11 to 15 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; strong fine and medium angular blocky structure; very hard, very firm, very sticky, very plastic; many very fine and fine roots; common very fine and fine pores; common very fine masses of salt; strongly effervescent; strongly alkaline (pH 8.6); clear smooth boundary.

Cz2—15 to 22 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; moderately hard, firm, very sticky, very

plastic; common very fine and fine roots; common very fine and fine pores; common very fine masses of salt; strongly effervescent; strongly alkaline (pH 8.8); clear smooth boundary.

Cgz1—22 to 41 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; common fine faint yellowish brown (10YR 5/4) moist, redox concentrations; massive; very hard, firm, very sticky, very plastic; few very fine and fine roots; few very fine and fine pores; few very fine masses of salt; strongly effervescent; strongly alkaline (pH 8.8); gradual smooth boundary.

Cgz2—41 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; common fine distinct brown (7.5YR 5/4) moist, redox concentrations; massive; moderately hard, firm, very sticky, very plastic; few very fine masses of salt; strongly effervescent; very strongly alkaline (pH 9.6).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the seasonal high water table: 24 to 42 inches

Az horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 1 to 7 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 8

Reaction: pH 7.4 to 8.4

Cz horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay consisting of stratified layers

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 2 to 16 mmhos/cm

Sodium adsorption ratio: 1 to 30

Reaction: pH 7.4 to 9.0

Cgz horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, silty clay loam, silt loam, or fine sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 5 to 30

Reaction: pH 7.9 to 9.6

Libeg Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, landslide, mountain, outwash plain, stream terrace, and terrace

Parent material: Gravelly alluvium or gravelly till

Slope range: 12 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Libeg very cobbly sandy loam, in an area of Libeg very cobbly sandy loam, 2 to 15 percent slopes, in an area of rangeland, 1,800 feet north and 1,600 feet west of the southeast corner of sec. 1, T. 4 N., R. 12 E.; USGS Amelong Creek topographic quadrangle (lat. 46°07'27" N.; long. 110°10'24" W.)

A—0 to 6 inches; very dark grayish brown (10YR 3/2) very cobbly sandy loam, black (10YR 2/1) moist; moderate fine granular structure; soft, friable, nonsticky, nonplastic; common medium and many very fine and fine roots; many very fine and fine pores; 20 percent gravel; 20 percent cobbles; 5 percent stones; neutral (pH 7.2); clear wavy boundary.

Bt1—6 to 15 inches; dark yellowish brown (10YR 4/4) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, friable, moderately sticky, moderately plastic; common fine and medium and many very fine roots; common very fine and fine pores; few distinct discontinuous dark brown (7.5YR 3/4) moist; clay films on faces of pedis; 30 percent gravel; 15 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

Bt2—15 to 25 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; few faint patchy brown (7.5YR 4/4) moist; clay films on faces of pedis; 40 percent gravel; 15 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

Bt3—25 to 35 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; soft, friable, moderately sticky, moderately plastic; few very fine roots; common very fine and fine pores; few faint patchy brown (7.5YR 5/4) moist; clay films on faces of pedis; 40 percent gravel; 15 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

BC—35 to 60 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, friable, moderately sticky, moderately plastic; common very fine and fine pores; 40 percent gravel; 15 percent cobbles; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 36 to 44 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Sandy loam or loam

Clay content: 5 to 35 percent

Content of rock fragments: 15 to 60 percent—5 to 50 percent stones and cobbles; 10 to 50 percent gravel

Reaction: pH 6.6 to 7.3

Bt1 and Bt2 horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4, or 6

Texture (less than 2 mm): Loam, clay loam, or sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 35 to 80 percent—10 to 50 percent stones and cobbles; 25 to 45 percent gravel

Reaction: pH 6.6 to 7.3

Bt3 horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture (less than 2 mm): Loam or sandy clay loam

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 85 percent—5 to 35 percent stones and cobbles; 30 to 50 percent gravel

Reaction: pH 6.1 to 7.3

BC horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4, or 6

Texture (less than 2 mm): Sandy loam or loam

Clay content: 10 to 25 percent

Content of rock fragments: 40 to 85 percent—10 to 50 percent stones and cobbles; 30 to 50 percent gravel

Reaction: pH 6.6 to 7.8

Linwell Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Fan, stream terrace, terrace, and swale on plain

Parent material: Clayey alluvium

Slope range: 0 to 35 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine, smectitic, frigid Entic Haplustolls

Typical Pedon

Linwell silty clay loam, in a cultivated field, 60 feet south and 590 feet west of the northeast corner of sec. 15, T. 18 N., R. 15 E.; Fergus County, Montana.

Ap—0 to 6 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; the surface 1 inch has moderate fine granular structure, and the lower 5 inches has moderate very fine and fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few medium and many very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.7); clear wavy boundary.

Bw—6 to 11 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to

moderate fine and medium subangular blocky; hard, friable, moderately sticky, moderately plastic; few medium and coarse and many very fine and fine roots; few medium and many very fine and fine pores; few worm casts; slightly effervescent; slightly alkaline (pH 7.6); clear wavy boundary.

Bk1—11 to 15 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, moderately sticky, moderately plastic; few medium and coarse and many very fine and fine roots; few medium and many very fine and fine pores; few worm casts; common very fine and fine masses of lime; strongly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk2—15 to 28 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, moderately sticky, moderately plastic; few medium and coarse and common very fine and fine roots; few medium and coarse and many very fine and fine pores; few worm casts; few medium masses of lime; strongly effervescent; moderately alkaline (pH 7.9); gradual wavy boundary.

Bk3—28 to 39 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; very hard, friable, moderately sticky, moderately plastic; few medium and coarse and many very fine and fine roots; few medium and coarse and many very fine and fine pores; few worm casts; common medium masses of lime; strongly effervescent; moderately alkaline (pH 7.9); diffuse wavy boundary.

C—39 to 67 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few distinct yellowish brown (10YR 5/6) redox concentrations; massive; very hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; few medium and many very fine and fine pores; few fine masses and seams of lime; strongly effervescent; moderately alkaline (pH 7.9).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 12 to 24 inches

Note: Some pedons do not have a C horizon.

A horizon*Hue:* 10YR or 2.5Y*Value:* 4 or 5 dry; 2 or 3 moist*Chroma:* 1 or 2*Texture (less than 2 mm):* Clay loam, silty clay loam, or loam*Clay content:* 30 to 40 percent*Content of rock fragments:* 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 15 percent gravel*Reaction:* pH 6.6 to 7.8**Bw horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, silty clay loam, or silty clay*Clay content:* 35 to 45 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 1 to 10 percent*Reaction:* pH 7.4 to 8.4**Bk and C horizons***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, silty clay loam, silty clay, or clay*Clay content:* 35 to 45 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 5 to 15 percent*Reaction:* pH 7.9 to 8.4**Lonna Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Fan and stream terrace*Parent material:* Silty alluvium*Slope range:* 2 to 8 percent*Elevation range:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Mean annual air temperature:* 43 to 46 degrees F*Frost-free period:* 95 to 125 days**Taxonomic Class:** Fine-silty, mixed, superactive, frigid Aridic Haplustepts**Typical Pedon**

Lonna silt loam, in an area of Lonna silt loam, 2 to 8 percent slopes, 1,800 feet south and 100 feet west of the northeast corner of sec. 6, T. 3 N., R. 20 E.; Stillwater County, Montana.

A—0 to 2 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; soft, friable, nonsticky, nonplastic; many very fine and fine roots; neutral (pH 7.2); clear smooth boundary.

Bw—2 to 11 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong medium angular blocky structure; slightly hard, friable, nonsticky, nonplastic; many very fine and fine roots and pores; neutral (pH 7.4); clear smooth boundary.

Bk—11 to 28 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, nonsticky, nonplastic; common very fine roots; many fine pores; common distinct masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

By—28 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, moderately sticky and nonplastic; thin lenses of very fine sandy loam; few very fine roots; common threads and nodules of gypsum; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the Bk horizon:* 10 to 12 inches**A horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 3 to 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Silt loam*Clay content:* 18 to 27 percent*Calcium carbonate equivalent:* 5 to 10 percent*Reaction:* pH 7.4 to 8.4**Bw horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Silt loam or silty clay loam*Clay content:* 18 to 35 percent*Calcium carbonate equivalent:* 0 to 10 percent*Reaction:* pH 7.4 to 8.4**Bk horizon***Hue:* 10YR or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Silt loam or silty clay loam

Clay content: 18 to 35 percent
Calcium carbonate equivalent: 5 to 12 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 1 to 13
Reaction: pH 7.9 to 9.0

By horizon

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Stratified silt loam and very fine sandy loam
Clay content: 18 to 27 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 1 to 13
Reaction: pH 7.9 to 9.0

Lymanson Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Mountain
Parent material: Loamy residuum weathered from sandstone and siltstone
Slope range: 2 to 50 percent
Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 36 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive Ustic Argicryolls

Typical Pedon

Lymanson loam, in an area of Cheadle-Lymanson-Gillispie complex, 2 to 15 percent slopes, in an area of rangeland, 2,200 feet south and 1,100 feet west of the northeast corner of sec. 36, T. 2 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°37'12" N.; long. 110°10'51" W.)

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly acid (pH 6.2); clear smooth boundary.

A2—4 to 8 inches; very dark grayish brown (10YR 3/2), loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; many very fine and

fine roots; many very fine and fine pores; slightly acid (pH 6.2); clear smooth boundary.

Bt1—8 to 15 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; neutral (pH 6.8); clear smooth boundary.

Bt2—15 to 21 inches; pale brown (10YR 6/3) clay loam; brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many fine roots; many fine pores; common faint discontinuous yellowish brown (10YR 5/4) moist; clay films on faces of peds and lining pores; neutral (pH 7.0); abrupt smooth boundary.

Bk—21 to 31 inches; light gray (2.5Y 7/2) gravelly loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine pores; fine and medium soft masses of lime; 17 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Cr—31 to 60 inches; thinly bedded calcareous sandstone and siltstone.

Range in Characteristics

Soil temperature: 39 to 44 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 23 inches

Depth to the Cr horizon: 20 to 40 inches

Note: Some pedons have a Btk horizon.

A horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent stones and cobbles; 0 to 15 percent gravel

Reaction: pH 6.6 to 8.4

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 35 percent gravel or channers
Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy loam, fine sandy loam, or sandy clay loam
Clay content: 15 to 27 percent
Content of rock fragments: 0 to 35 percent gravel or channers
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Macar Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Fan, hill, stream terrace, fan on escarpment, swale on escarpment, fan on plain, and swale on plain
Parent material: Loamy alluvium
Slope range: 0 to 25 percent
Elevation range: 3,900 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustepts

Typical Pedon

Macar loam, in an area of Macar loam, calcareous surface, 4 to 8 percent slopes, in an area of rangeland, 1,000 feet south and 2,000 feet east of the northwest corner of sec. 36, T. 5 N., R. 14 E.; USGS Melville NW topographic quadrangle (lat. 46°08'41" N.; long. 109°55'02" W.)

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

Bw—4 to 12 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; soft, very

friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bk1—12 to 33 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; few fine threads of lime; strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

Bk2—33 to 48 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; few fine pores; common fine threads and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk3—48 to 60 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; few fine pores; common fine threads and medium soft masses of lime; 10 percent gravel; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 11 to 24 inches
Note: Some pedons have a BC horizon.

A horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4 or 6
Texture (less than 2 mm): Loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 6.6 to 8.4

Bk1 horizon*Hue:* 10YR, 2.5Y, or 5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 to 4 or 6*Texture (less than 2 mm):* Loam, clay loam, or silty clay loam*Clay content:* 18 to 35 percent*Content of rock fragments:* 0 to 5 percent gravel*Calcium carbonate equivalent:* 8 to 15 percent*Reaction:* pH 7.4 to 8.4**Bk2 and Bk3 horizons***Hue:* 10YR, 2.5Y, or 5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 to 4 or 6*Texture (less than 2 mm):* Loam, clay loam, or silty clay loam*Clay content:* 15 to 30 percent*Content of rock fragments:* 0 to 5 percent gravel*Calcium carbonate equivalent:* 5 to 12 percent*Reaction:* pH 7.4 to 9.0**Marcott Taxadjunct***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Somewhat poorly drained*Permeability:* In the upper 0 to 32 inches = slow (0.06 to 0.20 inch/hour); below this depth = moderately rapid (2 to 6 inches/hour)*Landform:* Fan, flood plain, and stream terrace*Parent material:* Clayey alluvium*Slope range:* 0 to 4 percent*Elevation range:* 3,750 to 6,000 feet*Mean annual precipitation:* 10 to 19 inches*Mean annual air temperature:* 43 to 46 degrees F*Frost-free period:* 85 to 130 days**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Oxyaquic Haplustolls

The Marcott soils as mapped in this survey area are taxadjunct to the series. They are outside the series range in that they have a mixed mineralogy class and the linear extensibility is not 6.0 or more between the mineral soil surface and a depth of 40 inches. Use and management are not significantly affected. Marcott series classifies as Fine, smectitic, frigid Aquertic Haplustolls.

Typical Pedon

Marcott gravelly loam, in an area of Marcott-Larry complex, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet north and 1,700 feet east of the

southwest corner of sec. 16, T. 1 N., R. 14 E.; USGS Big Timber topographic quadrangle (lat. 45°49'59" N.; long. 109°59'38" W.)

Az—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; few fine masses of salt; 20 percent gravel; slightly effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bz1—5 to 9 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; moderately hard, friable, moderately sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; common fine threads of salt; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bz2—9 to 22 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; many very fine and fine pores; common fine and medium masses of salt; 5 percent gravel; strongly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.

Bkgz—22 to 32 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; common fine and medium faint yellowish brown (10YR 5/4) moist, redox concentrations; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; many very fine and fine pores; common fine and medium threads of lime; common fine masses of salt; 5 percent gravel; strongly effervescent; strongly alkaline (pH 9.0); clear smooth boundary.

2Cg1—32 to 41 inches; grayish brown (10YR 5/2) gravelly fine sandy loam, dark grayish brown (10YR 4/2) moist; common medium and coarse distinct strong brown (7.5YR 4/6) moist, redox concentrations; single grain; soft, loose, nonsticky, nonplastic; 25 percent gravel; slightly effervescent; strongly alkaline (pH 8.6); abrupt smooth boundary.

3Cg2—41 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; thin strata of finer textured material; slightly effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches; the upper 7 inches, when mixed, meet the requirements of a mollic epipedon.

Depth to the seasonal high water table: 24 to 60 inches

Depth to the Bk horizon: 12 to 24 inches

Depth to the 3C horizon: 36 to 50 inches

Az horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Clay loam or loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent gravel

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 20

Reaction: pH 6.6 to 8.4

Bz horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 25

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

Bkgz horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 3 to 12 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 25

Reaction: pH 7.4 to 8.4

2Cg horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Sandy loam, fine sandy loam, or loam

Clay content: 10 to 27 percent

Content of rock fragments: 10 to 35 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 30

Reaction: pH 7.4 to 9.0

3Cg horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loamy sand, loamy coarse sand, or sand

Clay content: 10 to 15 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 0 to 60 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 20

Reaction: pH 7.4 to 9.0

Marmarth Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill, terrace, and swale on plain

Parent material: Loamy residuum weathered from sandstone and siltstone

Slope range: 2 to 15 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Marmarth loam, in an area of Marmarth loam, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet south and 400 feet east of the northwest corner of sec. 11, T. 3 N., R. 17 E.; USGS Gibson topographic quadrangle (lat. 46°01'42" N.; long. 109°35'16" W.)

A—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 6.7); clear smooth boundary.

Bt1—5 to 9 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; common faint discontinuous dark yellowish brown

(10YR 3/4) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—9 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine pores; common distinct discontinuous brown (7.5YR 4/2) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bk1—15 to 25 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine pores; few fine threads and fine and medium soft masses of lime; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk2—25 to 34 inches; light gray (2.5Y 7/2) very fine sandy loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; few fine roots; common very fine and fine pores; few fine threads and soft masses of lime; 10 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Cr—34 to 60 inches; soft calcareous sandstone.

Range in Characteristics

Soil temperature: 42 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.1 to 7.8

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, very fine sandy loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Martinsdale Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Fan and terrace

Parent material: Loamy alluvium

Slope range: 0 to 15 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Martinsdale gravelly loam, in an area of Martinsdale gravelly loam, 0 to 4 percent slopes, in an area of rangeland, 800 feet south and 500 feet west of the northeast corner of sec. 32, T. 5 N., R. 14 E.; USGS Melville NW topographic quadrangle (lat. 46°08'44" N.; long. 109°59'24" W.)

A—0 to 4 inches; brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—4 to 10 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/3) moist; moderate fine and medium prismatic structure parting to moderate very fine and fine subangular blocky; very hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; many prominent continuous dark brown (7.5YR 3/4) moist; clay films on faces of

pedes and lining pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt2—10 to 16 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; strong medium and coarse subangular blocky structure parting to strong fine and medium subangular blocky; very hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; common distinct discontinuous (7.5YR 3/4) moist; clay films on faces of pedes; 10 percent gravel; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bk1—16 to 29 inches; light gray (10YR 7/2) gravelly sandy loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; moderately hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; carbonate coats on rock fragments; few soft masses of lime; 20 percent gravel; violently effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk2—29 to 60 inches; light brownish gray (10YR 6/2) gravelly sandy loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; carbonate coats on rock fragments; few soft masses of lime and thin threads of lime; 20 percent gravel; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 16 inches

Depth to the calcic horizon: 11 to 30 inches

Note: Some pedons have a Btk horizon and, below a depth of 40 inches, a BC horizon.

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 8.4

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 3 or 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam, loam, clay loam, or sandy clay loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 15 to 35 percent

Electrical conductivity: 0 to 4 mmhos/cm

Gypsum content: 0 to 1 percent

Reaction: pH 7.4 to 9.0

Mcllwaine Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: In the upper 0 to 24 inches = moderately rapid (2 to 6 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Flood plain

Parent material: Coarse loamy over sandy and gravelly alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 85 to 130 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Cumulic Haplustolls

Typical Pedon

Mcllwaine loam, in an area of Nesda-Mcllwaine loams, 0 to 2 percent slopes, in an area of deciduous forest, 2,300 feet north and 1,300 feet west of the southeast corner of sec. 34, T. 1 N., R. 14 E.; USGS Big Timber topographic quadrangle (lat. 45°47'30" N.; long. 109°57'53" W.)

A—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; 5 percent gravel; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

A2—9 to 21 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; common very fine pores; thin strata of light brownish gray (10YR 6/2) loam and loamy fine sand, grayish brown (10YR 5/2) moist; 5 percent gravel; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

A3—21 to 25 inches; dark grayish brown and grayish brown (10YR 4/2 and 5/2) fine sandy loam, very dark brown and grayish brown (10YR 2/2 and 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; common very fine pores; thin strata of grayish brown (10YR 5/2) moist, loam and loamy fine sand; 10 percent gravel; slightly effervescent; slightly alkaline (pH 7.8); abrupt wavy boundary.

2C—25 to 60 inches; light brownish gray (10YR 7/2) extremely gravelly coarse sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; 45 percent gravel; 20 percent cobbles; 5 percent stones; disseminated lime with segregated lime around rock fragments; slightly to strongly effervescent; slightly alkaline (pH 7.4).

Range in Characteristics

Soil temperature: 40 to 43 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 20 to 40 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 7 to 15 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.6 to 7.8

A2 and A3 horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 to 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam or loam with strata of finer and coarser material

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 6.6 to 7.8

2C horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Coarse sand or loamy sand

Clay content: 1 to 5 percent

Content of rock fragments: 35 to 80 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 30 to 50 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 6.6 to 7.8

Meadowcreek Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: In the upper 0 to 31 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Flood plain, stream terrace, drainageway on fan

Parent material: Fine-loamy over sandy and gravelly alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 130 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Fluvaquent Haplustolls

Typical Pedon

Meadowcreek loam, in an area of Meadowcreek-Nesda loams, 0 to 2 percent slopes, in an area of hayland, 2,900 feet north and 1,400 feet west of the southeast corner of sec. 8, T. 1 S., R. 13 E.; USGS Kelly Hills topographic quadrangle (lat. 45°45'49" N.; long. 110°08'31" W.)

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; few very fine pores; 5 percent gravel; 2 percent cobbles;

slightly alkaline (pH 7.4); abrupt smooth boundary.

A2—5 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few very fine pores; slightly alkaline (pH 7.6); clear smooth boundary.

A3—10 to 15 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; slightly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bg1—15 to 26 inches; grayish brown and light brownish gray (2.5Y 5/2 and 6/2) stratified loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct strong brown (7.5YR 4/6) moist, redox concentrations; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bg2—26 to 32 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; common medium prominent strong brown (7.5YR 4/6) moist, redox concentrations, common medium faint dark gray (2.5Y 4/1) moist, redox depletions; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; few very fine roots; common very fine pores; slightly effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

2C—32 to 60 inches; light gray (10YR 7/2) very gravelly coarse sand, grayish brown and light brownish gray (10YR 5/2 and 6/2) moist; single grain; loose, nonsticky, nonplastic; common carbonate coats on undersides of rock fragments; 40 percent gravel; 5 percent cobbles; 3 percent stones; slightly to strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 15 inches

Depth to the seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 20 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 7.4 to 8.4

Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 1 to 3

Redox concentrations: Few to many; chroma of 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Loam, sandy loam, fine sandy loam, or sandy clay loam

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

2C horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent stones and cobbles; 35 to 70 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.1 to 7.3

Meagher Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 30 inches = moderate (0.6 to 2.0 inches/hour); below this depth = moderately rapid (2 to 6 inches/hour)

Landform: Terrace

Parent material: Loamy alluvium

Slope range: 2 to 8 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Meagher gravelly loam, in an area of Meagher gravelly loam, 2 to 8 percent slopes, in an area of rangeland, 2,800 feet south and 2,200 feet west of the northeast corner of sec. 6, T. 2 S., R. 13 E.; USGS McLeod topographic quadrangle (lat. 45°41'22" N.; long. 110°02'29" W.)

- A—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky, slightly plastic; common fine and many very fine roots; common fine and many very fine pores; 10 percent gravel; 5 percent cobbles; neutral (pH 6.6); abrupt smooth boundary.
- Bt1—7 to 12 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; moderately hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common fine and many very fine pores; common faint discontinuous dark yellowish brown (10YR 4/4), moist; clay films on faces of peds and lining pores; 10 percent gravel; neutral (pH 6.8); clear smooth boundary.
- Bt2—12 to 19 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; moderately hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common fine and many very fine pores; common faint discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; 10 percent gravel; 2 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.
- Bk1—19 to 30 inches; very pale brown (10YR 8/3) gravelly loam, pale brown (10YR 6/3) moist; weak medium and coarse subangular blocky structure; soft, friable, slightly sticky, slightly plastic; few very fine roots; common fine and many very fine pores; 20 percent gravel; common fine and medium masses of lime; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
- 2Bk2—30 to 60 inches; very pale brown (10YR 8/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak medium and coarse subangular blocky structure; soft, friable, slightly sticky, slightly plastic; few fine and many very

fine pores; many carbonate coats on rock fragments; many fine and medium masses of lime; 40 percent gravel; 10 percent cobbles; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 40 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to the 2Bk horizon: 20 to 35 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent stones and cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.6 to 7.8

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 6 or 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent gravel

Calcium carbonate equivalent: 15 to 40 percent

Gypsum content: 0 to 1 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam, loam, or sandy clay loam

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 70 percent—0 to 10 percent cobbles; 35 to 60 percent gravel

Calcium carbonate equivalent: 15 to 40 percent
Gypsum content: 0 to 1 percent
Reaction: pH 7.9 to 8.4

Megonot Series

Depth class: Moderately deep (40 to 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.20 inch/hour)
Landform: Escarpment, hill, and swale on plain
Parent material: Clayey residuum weathered from shale
Slope range: 2 to 25 percent
Elevation range: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Torreritic Haplustepts

Typical Pedon

Megonot clay loam, in an area of Cabbart-Megonot-Kobase clay loams, 2 to 15 percent slopes, in an area of rangeland, 2,600 feet south and 1,550 feet west of the northeast corner of sec. 25, T. 4 N., R. 14 E.; USGS Melville topographic quadrangle (lat. 46°04'04" N.; long. 109°55'16" W.)

A—0 to 3 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate very fine and fine granular; slightly hard, very friable, slightly sticky, moderately plastic; common very fine roots; many very fine pores; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

Bw—3 to 11 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to strong very fine and fine subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; many very fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk—11 to 20 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate fine and medium subangular blocky structure; very hard, friable, very sticky, very plastic; common very fine roots; common very fine pores; common fine and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bky—20 to 31 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; very hard, firm, very sticky, very plastic; few very fine roots; common very fine pores; few very fine platelike crystals of gypsum; few fine masses of lime; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Cr—31 to 60 inches; bedrock; clayey siltstone that crushes to clay; strongly effervescent.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 11 to 17 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam
Clay content: 35 to 40 percent
Content of rock fragments: 0 to 15 percent gravel
Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 1 to 10 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 1 to 15 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

Bky horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 dry; 4 or 5 moist
Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 5 to 30 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Electrical conductivity: 0 to 4 mmhos/cm
Gypsum content: 1 to 5 percent
Reaction: pH 6.6 to 8.4

Melville Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: In the upper 0 to 23 inches = moderately slow (0.2 to 0.6 inch/hour); below this depth = moderate (0.6 to 2.0 inches/hour)
Landform: Outwash plain and terrace
Parent material: Gravelly alluvium, gravelly glaciofluvial deposits or gravelly till
Slope range: 0 to 15 percent
Elevation range: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 36 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Melville cobbly loam, in an area of rangeland, currently Denied Access, 20 feet south and 1,480 feet east of the northwest corner of sec. 3, T. 5 N., R. 13 E.; USGS Porcupine Butte topographic quadrangle (lat. 46°13'13" N.; long. 110°05'09" W.)

- A—0 to 2 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; weak thin platy structure parting to moderate very fine granular; soft, very friable, slightly sticky, nonplastic; very few clean quartz grains; 10 percent gravel; 15 percent cobbles; neutral; clear smooth boundary.
- Bt1—2 to 5 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure parting to moderate fine granular; soft very friable, slightly sticky, slightly plastic; continuous faint clay films on faces of peds; few unstained sand grains; 10 percent gravel; 5 percent cobbles; neutral; clear wavy boundary.
- Bt2—5 to 8 inches; dark brown (7.5YR 4/3) gravelly clay, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to strong very

fine and fine subangular blocky; hard, friable, moderately sticky, moderately plastic; continuous distinct clay films on faces of peds; few unstained sand grains; 10 percent gravel; 5 percent cobbles; neutral; clear smooth boundary.

- Bt3—8 to 14 inches; dark brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; strong fine and medium prismatic structure parting to strong very fine and fine subangular blocky; very hard, friable, very sticky, very plastic; discontinuous prominent clay films on faces of peds; 5 percent gravel; 5 percent cobbles; neutral; gradual wavy boundary.
- Bt4—14 to 18 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong fine and medium prismatic structure parting to strong very fine and fine subangular blocky; very hard, friable, moderately sticky, very plastic; continuous prominent clay films on faces of peds; 5 percent gravel; 5 percent cobbles; neutral; gradual wavy boundary.
- Bt5—18 to 23 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to strong fine subangular blocky; hard friable, slightly sticky, slightly plastic; continuous faint clay films on horizontal and distinct on vertical faces of peds; 20 percent gravel; 5 percent cobbles; neutral; abrupt wavy boundary.
- Bk1—23 to 30 inches; light gray and white (2.5Y 7/2 and 8/2) very gravelly loam, light olive brown and pale yellow (2.5Y 5/3 and 7/3) moist; massive; very hard, friable, slightly sticky, slightly plastic; many carbonate coats on rock fragments; many soft masses of lime; 30 percent gravel; 5 percent cobbles; strongly effervescent; moderately alkaline; clear wavy boundary.
- 2Bk2—30 to 40 inches; light yellowish brown and white (2.5Y 6/3 and 8/3) very gravelly coarse sandy loam, olive brown and pale yellow (2.5Y 4/3 and 7/2) moist; massive; very hard, friable, slightly sticky, slightly plastic; many threads of lime throughout and carbonate coats on rock fragments; 40 percent gravel; 10 percent cobbles; strongly effervescent; moderately alkaline; gradual wavy boundary.
- 2Bk3—40 to 60 inches; light yellowish brown and white (2.5Y 6/3 and 8/3) very cobbly coarse sandy loam, light olive brown and pale yellow (2.5Y 4/3 and 7/3) moist; massive; hard, friable, slightly sticky, slightly plastic; many threads of lime throughout and carbonate coats on rock fragments; 30 percent gravel; 20 percent cobbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 44 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 16 inches

Depth to the 2Bk horizon: 17 to 35 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 0 to 15 percent gravel

Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 10YR, 7.5YR, or 2.5Y

Value: 4 to 6 dry; 2 to 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 7.8

Bk and 2Bk horizons

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 25 percent cobbles; 15 to 40 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Merino Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Mountain

Parent material: Loamy residuum weathered from volcanic breccia

Slope range: 8 to 50 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 37 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Eutrocryepts

Typical Pedon

Merino very gravelly sandy loam, in an area of Merino-Elve-Rock outcrop complex, 25 to 80 percent slopes, in an area of rangeland, 2,600 feet south and 1,200 feet east of the northwest corner of sec. 1, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°36'15" N.; long. 110°04'09" W.)

A—0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; 40 percent gravel; neutral (pH 6.6); clear smooth boundary.

AC—2 to 7 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; 40 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

C—7 to 12 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and medium roots; many very fine and fine pores; 40 percent gravel; 5 percent cobbles; 5 percent stones; moderately acid (pH 6.0); abrupt smooth boundary.

R—12 inches; unweathered bedrock; volcanic mudflow breccia.

Range in Characteristics

Soil temperature: 38 to 46 degrees F

Depth to bedrock: 6 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 35 to 70 percent—0 to 10 percent stones and cobbles; 35 to 60 percent gravel

Reaction: pH 6.1 to 7.3

AC and C horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 12 to 20 percent

Content of rock fragments: 35 to 80 percent—0 to 10 percent stones and cobbles; 35 to 70 percent gravel

Reaction: pH 5.6 to 6.5

Millerlake Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, mountain, terrace, and fan on mountain

Parent material: Loamy alluvium or colluvium

Slope range: 4 to 35 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Pachic Argicryolls

Typical Pedon

Millerlake loam, in an area of Millerlake-Arrowpeak-Adel complex, 8 to 35 percent slopes, in an area of rangeland, 1,300 feet south and 1,400 feet west of the northeast corner of sec. 21, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°54'40" N.; long. 110°14'08" W.)

A—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, slightly plastic; few medium, common fine, and many very fine roots; many very fine and fine pores; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—7 to 16 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; common faint discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds; 5 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bt2—16 to 24 inches; light yellowish brown (2.5Y 6/4) clay loam, grayish brown (2.5Y 5/2) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; few

distinct discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds; 5 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bk—24 to 60 inches; light brownish gray (10YR 6/2) gravelly clay loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine and fine pores; common fine threads and soft masses of lime; 10 percent gravel; 5 percent cobbles; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 36 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 16 to 20 inches

Depth to the Bk horizon: 20 to 39 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 30 percent

Content of rock fragments: 10 to 35 percent—0 to 15 percent cobbles; 10 to 20 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Monaberg Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan and mountain

Parent material: Loamy alluvium or colluvium

Slope range: 2 to 45 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Pachic Argicryolls

The Monaberg soils as mapped in this survey area are taxadjunct to the series. They are outside the series range with a mollic epipedon that is 16-inches or more thick and has a texture finer than loamy fine sand. Use and management are not significantly affected. Monaberg series classifies Fine-loamy, mixed, superactive Ustic Argicryolls.

Typical Pedon

Monaberg loam, in an area of Monaberg loam, 4 to 15 percent slopes, in an area of tame pasture, 2,200 feet south and 1,300 feet east of the northwest corner of sec. 6, T. 2 N., R. 13 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°57'12" N.; long. 110°09'42" W.)

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, very dark gray (10YR 3/1) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; few coarse, common medium, and many very fine and fine roots; many very fine and fine pores; 10 percent gravel; neutral (pH 6.6); clear smooth boundary.

A2—9 to 15 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; 15 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt1—15 to 25 inches; brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure parting to moderate very fine and fine granular; slightly hard, friable, slightly sticky, moderately plastic; few medium and common very fine and fine roots; many very fine and fine pores; distinct continuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and rock fragments; 20 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt2—25 to 37 inches; brown (10YR 5/3) gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure;

slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; distinct continuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and rock fragments; 20 percent gravel; 10 percent cobbles; neutral (pH 6.8); clear smooth boundary.

2Bt3—37 to 60 inches; brown (10YR 5/3) cobbly clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; few fine roots; common very fine and fine pores; faint discontinuous dark yellowish brown (10YR 4/4) moist; clay films on rock fragments; 15 percent gravel and 15 percent cobbles; slightly acid (pH 6.2).

Range in Characteristics

Soil temperature: 38 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 15 inches

Note: Some pedons have a BC horizon, and some pedons do not have a 2Bt horizon.

A horizons

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel

Reaction: pH 5.6 to 7.3

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent gravel

Reaction: pH 5.6 to 7.3

2Bt horizon:

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 15 to 35 percent—0 to 15 percent cobbles; 15 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Mowbray Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Landslide and fan on escarpment

Parent material: Gravelly colluvium weathered from calcareous sandstone

Slope range: 15 to 60 percent

Elevation range: 4,200 to 7,900 feet

Mean annual precipitation: 15 to 25 inches

Mean annual air temperature: 36 to 45 degrees F

Frost-free period: 50 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts

Typical Pedon

Mowbray channery loam, in an area of Castner-Mowbray-Rock outcrop complex, 25 to 60 percent slopes, in an area of rangeland, 900 feet north and 700 feet east of the southwest corner of sec. 31, T. 3 S., R. 13 E.; USGS McLeod Basin topographic quadrangle (lat. 45°36'49" N.; long. 110°10'24" W.)

A—0 to 6 inches; grayish brown (10YR 5/2) channery loam, dark grayish brown (10YR 4/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; few coarse and many very fine and fine roots; 25 percent channers; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bw—6 to 14 inches; grayish brown (2.5Y 5/2) very channery loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine subangular blocky structure parting to moderate very fine and fine granular; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; 30 percent channers; 5 percent cobbles; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—14 to 29 inches; grayish brown (2.5Y 5/2) very channery sandy loam, very dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure parting to weak very fine and fine granular; soft, friable, nonsticky, nonplastic; common very fine and fine roots; common fine and medium soft masses of lime; 25 percent channers; 20 percent cobbles; strongly effervescent; moderately alkaline (pH 7.8); clear smooth boundary.

Bk2—29 to 37 inches; grayish brown (2.5Y 5/2) very channery loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure;

slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and coarse roots; common fine soft masses of lime; 40 percent channers; 15 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bck—37 to 60 inches; light brownish gray (2.5Y 6/2) extremely channery loam, dark grayish brown (2.5Y 4/2) moist; massive; moderately hard, friable, nonsticky, nonplastic; common fine threads of lime; 40 percent channers; 25 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 60 percent—0 to 10 percent flagstones; 0 to 10 percent cobbles; 15 to 45 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 30 to 60 percent—5 to 25 percent flagstones or cobbles; 25 to 35 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 40 to 80 percent—10 to 35 percent flagstones or cobbles; 30 to 45 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bck horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 40 to 80 percent—
10 to 35 percent flagstones or cobbles; 30 to
45 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Mowbray Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hills and escarpments

Parent material: Gravelly colluvium weathered from
calcareous sandstone

Slope range: 15 to 35 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 39 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed,
superactive Ustic Eutrocrypts

The Mowbray soils as mapped in map unit 430E are a taxadjunct to the series. They are outside the series range with a cryic temperature regime, and the mean summer soil temperature at a depth of 20 inches from the soil surface is lower than 15 degrees C. Use and management are not significantly affected. Mowbray series classifies Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts.

Typical Pedon

Mowbray channery loam, in an area of Castner-Mowbray-Rock outcrop complex, 25 to 60 percent slopes, in an area of rangeland, 900 feet north and 700 feet east of the southwest corner of sec. 31, T. 3 S., R. 13 E.; USGS McLeod Basin topographic quadrangle (lat. 45°36'49" N.; long. 110°10'24" W.)

A—0 to 6 inches; grayish brown (10YR 5/2) channery loam, dark grayish brown (10YR 4/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, few coarse roots; 25 percent channers; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bw—6 to 14 inches; grayish brown (2.5Y 5/2) very channery loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine subangular

blocky structure parting to moderate very fine and fine granular; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; 30 percent channers; 5 percent cobbles; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—14 to 29 inches; grayish brown (2.5Y 5/2) very channery sandy loam, very dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure parting to weak very fine and fine granular; soft, friable, nonsticky, nonplastic; common very fine and fine roots; common fine and medium soft masses of lime; 25 percent channers; 20 percent cobbles; strongly effervescent; moderately alkaline (pH 7.8); clear smooth boundary.

Bk2—29 to 37 inches; grayish brown (2.5Y 5/2) very channery loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine, fine, and coarse roots; common fine soft masses of lime; 40 percent channers; 15 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bck—37 to 60 inches; light brownish gray (2.5Y 6/2) extremely channery loam, dark grayish brown (2.5Y 4/2) moist; massive; moderately hard, friable, nonsticky, nonplastic; common fine threads of lime; 40 percent channers; 25 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 38 to 41 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 60 percent—0 to
10 percent flagstones; 0 to 10 percent cobbles;
15 to 45 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 30 to 60 percent—5 to 25 percent flagstones or cobbles; 25 to 35 percent gravel or channers

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 40 to 80 percent—10 to 35 percent flagstones or cobbles; 30 to 45 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

BCK horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 40 to 80 percent—10 to 35 percent flagstones or cobbles; 30 to 45 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Nesda Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 12 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Flood plain

Parent material: Sandy and gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 130 days

Taxonomic Class: Sandy-skeletal, mixed, frigid
Fluventic Haplustolls

Typical Pedon

Nesda loam, in an area of Nesda-McIlwaine loams, 0 to 2 percent slopes, in an area of deciduous forest, 200 feet north and 300 feet west of the southeast corner of sec. 15, T. 2 N., R. 13 E.; USGS Grosfield Ranch topographic quadrangle (lat. 45°54'58" N.; long. 110°05'04" W.)

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine pores; 10 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

A2—2 to 12 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel; 5 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.

2C1—12 to 28 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 30 percent gravel; 10 percent cobbles; few distinct carbonate coats on rock fragments; slightly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

2C2—28 to 60 inches; grayish brown (10YR 5/2) extremely gravelly sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; 45 percent gravel; 15 percent cobbles; common distinct carbonate coats on rock fragments; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 12 and 35 inches

Thickness of the mollic epipedon: 10 to 16 inches

Depth to the 2C horizon: 10 to 20 inches

A horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 60 percent—0 to 15 percent stones and cobbles; 0 to 45 percent gravel

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 6.6 to 7.8

2C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 15 percent stones and cobbles; 35 to 60 percent gravel

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

Newtman Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Very poorly drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Flood plain, depression on terrace

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 85 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, nonacid, frigid Histic Endoaquolls

Newtman soils as mapped in this survey area are taxadjunct to the series. They are outside the series range with a mollic epipedon directly below the histic epipedon and lower reaction and calcium carbonate equivalent in the 10- to 20-inch calcareous and reaction class control section. Use and management are not significantly affected. Newtman series classifies Fine-loamy, mixed, superactive, calcareous, frigid Histic Humaquepts.

Typical Pedon

Newtman muck, in an area of Newtman muck, 0 to 2 percent slopes, in an area of rangeland, 1,300 feet south and 600 feet east of the northwest corner of sec. 3, T. 4 N., R. 13 E.; USGS Melville NW topographic quadrangle (lat. 46°07'46" N.; long. 109°58'29" W.) (Colors are for moist soil unless otherwise noted.)

Oa1—0 to 4 inches; black (10YR 2/1) muck, very dark gray (10YR 3/1) dry; about 30 percent fibers unrubbed, 10 percent rubbed; soft, very friable, nonsticky, nonplastic; many fine and medium roots; slightly acid (pH 6.4); clear smooth boundary.

Oa2—4 to 11 inches; black (10YR 2/1) muck, very dark gray (10YR 3/1) dry; about 25 percent fibers unrubbed, 5 percent rubbed; soft, very friable, nonsticky, nonplastic; many fine and medium roots; slightly acid (pH 6.4); clear smooth boundary.

Ag—11 to 22 inches; very dark gray (5Y 3/1) loam, dark gray (5Y 4/1) dry; common fine and medium prominent olive (5Y 5/6) moist, redox concentrations; weak fine granular structure; moderately hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; neutral (pH 6.6); gradual smooth boundary.

Cg1—22 to 36 inches; very dark gray (5Y 3/1) loam, gray (5Y 5/1) dry; common fine and medium prominent olive (5Y 5/6) moist, redox concentrations; massive; moderately hard, very friable, slightly sticky, slightly plastic; few fine roots; 5 percent gravel; neutral (pH 6.8); gradual smooth boundary.

2Cg2—36 to 60 inches; dark gray (5Y 4/1) very gravelly loam, gray (5Y 6/1) dry; common fine and medium prominent olive (5Y 5/6) moist, redox concentrations; massive; moderately hard, very friable, slightly sticky, slightly plastic; 35 percent gravel; 5 percent cobbles; neutral (pH 7.2).

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the histic epipedon: 8 to 16 inches

Depth to the 2C horizon: 24 to 40 inches

Depth to the seasonal high water table: +6 to 12 inches

Oa horizons

Hue: 10YR or N

Value: 2 or 3 moist

Chroma: 0 or 1

Reaction: pH 6.1 to 7.8

A horizon

Hue: 10YR, 5Y, or N

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 0 or 1

Redox concentrations: None to common; chroma of 4 or 6

Texture (less than 2 mm): Loam, silt loam, or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Cg horizon

Hue: 5Y or N

Value: 4 to dry; 2 to 6 moist

Chroma: 0 to 2

Redox concentrations: None to common; chroma of 4 or 6

Texture (less than 2 mm): Clay loam, silt loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

2Cg horizon

Hue: 5Y, 2.5Y, or N

Value: 4 to 6 dry; 2 to 5 moist

Chroma: 0 to 2

Redox concentrations: None to many; chroma of 4 or 6

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Clay loam, sandy loam, or loam

Clay content: 18 to 30 percent

Content of rock fragments: 25 to 60 percent—5 to 15 percent cobbles; 20 to 45 percent gravel

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

Novary Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Poorly drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Flood plain, pothole on landslide, swale on landslide, and drainageway on mountain

Parent material: Loamy alluvium

Slope range: 0 to 6 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous Cumulic Cryaquolls

Typical Pedon

Novary loam, in an area of Mowbray-Bridger-Novary complex, 0 to 35 percent slopes, in an area of rangeland, 2,000 feet south and 100 feet east of the northwest corner of sec. 11, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°35'25" N.; long. 110°12'58" W.)

A1—0 to 9 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky, slightly plastic; common medium

and many very fine and fine roots; many very fine and fine pores; 5 percent gravel; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

A2—9 to 13 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; few fine distinct dark yellowish brown (10YR 4/6) moist, redox concentrations; moderate medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; common medium and many very fine and fine roots; many very fine and fine pores; 5 percent gravel; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

A3—13 to 21 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; many fine distinct dark yellowish brown (10YR 4/6) moist, redox concentrations; moderate medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common medium and many very fine and fine roots; common very fine and fine pores; 5 percent gravel; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

A4—21 to 29 inches; very dark grayish brown (10YR 3/2) gravelly clay loam, very dark brown (10YR 2/2) moist; common fine and medium distinct dark yellowish brown (10YR 4/6) moist, redox concentrations; weak medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; 10 percent gravel; 5 percent cobbles; slightly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

Cgk1—29 to 38 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 4/2) moist; few fine and medium faint olive (5Y 5/4) moist, redox concentrations; massive; moderately hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; few carbonate coats on rock fragments; 20 percent gravel; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

Cgk2—38 to 49 inches; grayish brown (2.5Y 5/2) cobbly clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct olive (5Y 5/6) moist, redox concentrations; massive; moderately hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common carbonate coats on rock fragments; 10 percent gravel; 10 percent cobbles; violently effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Cgk3—49 to 60 inches; grayish brown (2.5Y 5/2) cobbly clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct olive (5Y 5/6) moist, redox concentrations; massive; moderately hard, friable, moderately sticky, moderately plastic; common carbonate coats on rock fragments, common fine and medium masses of lime; 10 percent gravel; 15 percent cobbles; strongly effervescent; slightly alkaline (pH 7.4).

Range in Characteristics

Soil temperature: 38 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 20 to 40 inches

Depth to the seasonal high water table: 6 to 24 inches

Note: Some pedons have a 2Cg horizon below a depth of 40 inches.

A1 horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 0 to 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

A2, A3, and A4 horizons

Hue: 10YR, 2.5Y, 5Y, or N

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 0 to 2

Redox concentrations: Few to many; chroma of 4 or 6

Texture (less than 2 mm): Loam, clay loam, or silt loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

Cgk horizons

Hue: N, 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 0 to 2

Redox concentrations: None to many; chroma of 4 or 6

Texture (less than 2 mm): Clay loam, silt loam, or loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent stones and cobbles; 5 to 20 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 7.4 to 8.4

Overfelt Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 27 inches = very slow (less than 0.6 inch/hour)

Landform: Fan, stream terrace, and terrace

Parent material: Clayey over gravelly alluvium

Slope range: 0 to 4 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Clayey over loamy-skeletal, smectitic over mixed, superactive, frigid Vertic Argiustolls

Typical Pedon

Overfelt clay loam, in an area of Overfelt-Roy complex, 0 to 4 percent slopes, in an area of pasture, 2,000 feet north and 2,400 feet east of the southwest corner of sec. 8, T. 1 S., R. 16 E.; USGS Greycliff topographic quadrangle (lat. 45°45'33" N.; long. 109°46'41" W.)

A—0 to 8 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; few medium and common fine roots; many very fine and fine pores; 2 percent gravel; 3 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

Bt1—8 to 16 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky, very plastic; common fine roots; common very fine and fine pores; common pressure faces and cracks 1/4- to 1/2-inch wide; many distinct continuous grayish brown (10YR 5/2) moist; clay films on faces of peds and lining pores; 5 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt2—16 to 27 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; moderate medium prismatic structure parting to strong medium

subangular blocky; very hard, firm, very sticky, very plastic; common fine roots; common very fine and fine pores; common pressure faces and cracks $\frac{1}{4}$ - to $\frac{1}{2}$ -inch wide; many distinct continuous grayish brown (10YR 5/2) moist; clay films on faces of peds and lining pores; 5 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

2Bk1—27 to 42 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common fine and medium pores; many distinct carbonate coats on undersides of rock fragments; 35 percent gravel; 15 percent cobbles; 5 percent stones; strongly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

3Bk2—42 to 60 inches; pale brown (10YR 6/3) very gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few faint carbonate coats on undersides of rock fragments; 35 percent gravel; 15 percent cobbles; 5 percent stones; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the 2Bk horizon: 20 to 36 inches

Depth to the 3Bk horizon: 40 to over 60 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay or silty clay

Clay content: 40 to 60 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.6 to 7.8

2Bk1 horizon

Hue: 7.5YR or 10YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy clay loam, clay loam, loam, or sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 30 to 45 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

3Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Coarse sand, sand, loamy sand, or loamy coarse sand

Clay content: 1 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 10 percent stones; 5 to 25 percent cobbles; 30 to 45 percent gravel

Calcium carbonate equivalent: 1 to 10 percent

Reaction: pH 7.4 to 8.4

Perma Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat excessively drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, hill, landslide, stream terrace, and fan on escarpment

Parent material: Gravelly alluvium or colluvium

Slope range: 0 to 60 percent

Elevation range: 3,900 to 6,200 feet

Annual precipitation: 15 to 20 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Perma cobbly loam, in an area of Perma, stony-Whitlash, very stony complex, 15 to 35 percent slopes, in an area of rangeland, 1,520 feet north and 2,590 feet east of the southwest corner of sec. 28, T. 7 N., R. 4 W.; Jefferson County, Montana.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; 15 percent angular cobbles; 15 percent angular gravel; neutral (pH 6.6); clear wavy boundary.

A2—7 to 13 inches; brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; 10 percent angular cobbles; 45 percent rounded gravel; neutral (pH 6.8); clear wavy boundary.

Bw1—13 to 28 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine pores; 15 percent angular cobbles; 35 percent angular gravel; neutral (pH 7.0); gradual wavy boundary.

Bw2—28 to 44 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine pores; 15 percent angular cobbles; 40 percent angular gravel; slightly alkaline (pH 7.4); gradual wavy boundary.

BC—44 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; 20 percent angular cobbles; 50 percent angular gravel; common faint carbonate coats on undersides of rock fragments; slightly alkaline (pH 7.4).

Range in Characteristics

Soil temperature: 38 to 42 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 10 to 15 inches

A horizons

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 7 to 27 percent

Content of rock fragments: 15 to 60 percent—0 to 30 percent stones and cobbles; 10 to 50 percent gravel

Reaction: pH 6.1 to 7.3

Surface stones or boulders: .01 to 3 percent

Bw horizons

Hue: 10YR or 7.5YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 7 to 20 percent

Content of rock fragments: 35 to 85 percent—0 to 50 percent stones and cobbles; 25 to 65 percent gravel

Reaction: pH 6.6 to 7.8

BC horizon

Hue: 10YR or 7.5YR

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, loamy sand, or sandy loam

Clay content: 0 to 15 percent

Content of rock fragments: 60 to 85 percent—10 to 25 percent stones and cobbles; 50 to 60 percent gravel

Reaction: pH 6.6 to 7.8

Pianohill Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill and structural bench

Parent material: Residuum weathered from tuff breccia

Slope range: 4 to 35 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Pianohill loam, in an area of Whitlash-Pianohill complex, 4 to 15 percent slopes, in an area of rangeland, 800 feet north and 2,100 feet east of the southwest corner of sec. 23, T. 2 S., R. 15 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°38'27" N.; long. 109°50'28" W.)

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 5 percent cobbles; slightly acid (pH 6.4); abrupt smooth boundary.

A2—6 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine

roots; many very fine and fine pores; slightly acid (pH 6.2); clear smooth boundary.

Bw—10 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 6.6); clear smooth boundary.

Bt1—16 to 21 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; common faint discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of pedis and lining pores; 5 percent gravel; neutral (pH 6.6); clear smooth boundary.

Bt2—21 to 29 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; soft, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; few faint discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of pedis and lining pores; 12 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

R—29 inches; volcanic mudflow breccia bedrock.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to bedrock: 20 to 40 inches

Note: Some pedons have a BC horizon, and some pedons do not have a Bw horizon.

A horizons

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.1 to 7.3

Bw horizon:

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 3 or 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Pintlar Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Swale on mountain

Parent material: Loamy alluvium

Slope range: 4 to 35 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive Ustic Palecryolls

Typical Pedon

Pintlar loam, in an area of Pintlar-Bridger complex, 4 to 35 percent slopes, in an area of deciduous forest, 1,900 feet north and 100 feet east of the southwest corner of sec. 13, T. 3 S., R. 13 E.; USGS Squaw peak topographic quadrangle (lat. 45°34'23" N.; long. 110°04'24" W.)

A1—0 to 7 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; strong very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; common medium and coarse and many very fine and fine roots; many very fine and fine pores; neutral (pH 6.8); clear smooth boundary.

A2—7 to 15 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine and

medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and medium and many very fine pores; neutral (pH 6.8); clear wavy boundary.

E—15 to 31 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few medium and common very fine and fine pores; 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

E/Bt—31 to 36 inches; E part (70 percent) light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist tongues; Bt part (30 percent) brown (10YR 5/3) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt—36 to 60 inches; brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; few faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and lining pores; 25 percent gravel; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 43 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 15 inches

Depth to the top of the argillic horizon: 24 to 40 inches

A horizons

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

E horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or silt loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent stones and cobbles; 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

E/Bt horizon

Hue: 5YR, 7.5YR, or 10YR

Value: E part—5 to 7, Bt part—4 to 6 dry; E part—4 or 5, Bt part—3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, silt loam, or clay loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bt horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent stones and cobbles; 5 to 20 percent gravel

Reaction: pH 6.1 to 7.3

Radersburg Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Fan, stream terrace, terrace, and fan on escarpment

Parent material: Gravelly alluvium

Slope range: 0 to 60 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 130 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Radersburg very cobbly loam, 300 feet west of the center of sec. 28, T. 8 N., R. 1 E.; Broadwater County, Montana.

A—0 to 4 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure parting to moderate very fine granular; slightly hard, very friable, slightly sticky, slightly plastic; 55 percent

cobbles and gravel; many very fine and fine roots and pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bt—4 to 15 inches; brown (10YR 5/3) very cobbly clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine angular blocky; hard, firm, moderately sticky, moderately plastic; 40 percent cobbles and gravel; common distinct clay films on faces of peds; many very fine and fine roots and pores; slightly alkaline (pH 7.8); clear smooth boundary.

Bk—15 to 30 inches; light gray (10YR 7/2) very cobbly silt loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky, slightly plastic; 45 percent cobbles and gravel; common distinct carbonate coats on undersides of rock fragments; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

C—30 to 60 inches; light yellowish brown (2.5Y 6/4) cobbly loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; 55 percent cobbles and gravel; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 60 percent—0 to 10 percent stones; 0 to 30 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay or clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 35 to 65 percent—5 to 20 percent stones; 20 to 30 percent cobbles; 10 to 15 percent gravel

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Silt loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 25 to 45 percent—5 to 10 percent stones; 10 to 20 percent cobbles; 10 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

C horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 25 to 45 percent—5 to 10 percent stones; 10 to 20 percent cobbles; 10 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Redchief Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Mountain, outwash plain, and terrace

Parent material: Gravelly alluvium, gravelly glaciofluvial deposits, or gravelly till

Slope range: 2 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Clayey-skeletal, smectitic Ustic Argicryolls

Typical Pedon

Redchief gravelly loam, in an area of Redchief gravelly loam, 4 to 15 percent slopes, in an area of rangeland, 300 feet south and 2,600 feet east of the northwest corner of sec. 14, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°55'44" N.; long. 110°11'58" W.)

A—0 to 8 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; hard, friable, slightly sticky, slightly plastic; many very fine to medium roots; common fine pores; 20 percent gravel; 5 cobbles; neutral (pH 6.8); clear wavy boundary.

Bt1—8 to 14 inches; brown (7.5YR 4/2) very gravelly clay loam, dark brown (7.5YR 3/3) moist; strong fine and medium subangular blocky structure;

very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; common prominent continuous brown (7.5YR 4/4) moist; clay films on faces of peds and lining pores; 25 percent gravel; 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bt2—14 to 25 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; very hard, firm, very sticky, very plastic; few very fine and fine roots; few very fine and fine pores; many prominent continuous dark reddish brown (5YR 4/4) moist; clay films on faces of peds and lining pores; 30 percent gravel; 15 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bt3—25 to 60 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; extremely hard, firm, very sticky, very plastic; common distinct patchy dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and rock fragments; 25 percent gravel; 15 percent cobbles; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 36 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 16 inches

A horizon

Hue: 7.5YR or 10YR

Value: 2 to 4 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 20 to 35 percent

Content of rock fragments: 15 to 40 percent—0 to 15 percent stones and cobbles; 15 to 25 percent gravel

Reaction: pH 5.1 to 7.3

Bt1 horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4, 6 or 8

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 60 percent

Content of rock fragments: 25 to 60 percent—0 to 20 percent stones and cobbles; 25 to 50 percent gravel

Reaction: pH 5.1 to 7.3

Bt2 horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 4, 6, or 8

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 60 percent

Content of rock fragments: 35 to 70 percent—5 to 20 percent stones and cobbles; 30 to 50 percent gravel

Reaction: pH 5.1 to 7.3

Bt3 horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4, 6, or 8

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 60 percent

Content of rock fragments: 35 to 70 percent—5 to 20 percent stones and cobbles; 30 to 60 percent gravel

Reaction: pH 5.1 to 7.3

Redfern Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Loamy residuum weathered from sandstone and siltstone

Slope range: 15 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryalfs

Typical Pedon

Redfern very channery loam, in an area of Redfern-Fifer complex, 25 to 60 percent slopes, in an area of coniferous forest, 2,500 feet north and 1,500 feet west of the southeast corner of sec. 12, T. 4 N., R. 12 E.; USGS Amelong Creek topographic quadrangle (lat. 46°06'40" N.; long. 110°10'12" W.)

Oi—0 to 2 inches; partially decomposed needles, twigs, and leaves.

E—2 to 7 inches; very dark grayish brown (2.5Y 3/2) very channery loam, grayish brown (2.5Y 5/2) dry; weak thin and medium platy structure and moderate very fine and fine subangular blocky; soft, friable, moderately sticky, moderately plastic; common medium and coarse and many very fine and fine roots; common very fine and fine interstitial and tubular pores; 35 percent angular

sandstone channers; neutral (pH 6.8); clear wavy boundary.

E/Bt—7 to 11 inches; 60 percent, very dark grayish brown (2.5Y 3/2) very channery loam, grayish brown (2.5Y 5/2) dry (E); 40 percent, olive brown (2.5Y 4/3) very channery clay loam, light olive brown (2.5Y 5/3) dry (Bt); weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium and many very fine roots; common very fine and fine interstitial and tubular pores; 40 percent angular sandstone channers; neutral (pH 6.8); clear wavy boundary.

Bt—11 to 20 inches; olive brown (2.5Y 4/3) very channery clay loam, light olive brown (2.5Y 5/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine interstitial and tubular pores; unspecified; 45 percent angular sandstone channers; neutral (pH 6.8); abrupt irregular boundary.

R—20 inches; bedrock; noneffervescent.

Range in Characteristics

Soil temperature: 38 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the argillic horizon: 3 to 13 inches

Depth to bedrock: 8 to 20 inches

Surface stones or boulders: 0 to 20 percent

E horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3, 5, or 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 20 percent cobbles; 25 to 40 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or sandy clay loam

Clay content: 23 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent stones; 15 to 30 percent cobbles; 20 to 45 percent gravel or channers

Reaction: pH 5.6 to 7.3

Reedpoint Series

Depth class: Very shallow (0 to 10 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, knoll on plain, and structural bench on plain

Parent material: Residium weathered from sandstone

Slope range: 2 to 60 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Reedpoint very channery loam, in an area of Ethridge-Reedpoint complex, 2 to 8 percent slopes, in an area of rangeland, 900 feet south and 100 feet east of the northwest corner of sec. 26, T. 4 N., R. 16 E.; USGS Gibson SW topographic quadrangle (lat. 46°04'17" N.; long. 109°42'26" W.)

A—0 to 5 inches; grayish brown (10YR 5/3) very channery loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; 38 percent sandstone channers; neutral (pH 7.2); abrupt smooth boundary.

R—5 inches; hard noncalcareous sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 inches and bedrock

Thickness of the mollic epipedon: 4 to 9 inches

Depth to bedrock: 4 to 10 inches

Note: Some pedons have a Bw horizon.

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 60 percent—0 to 15 percent flagstones; 35 to 45 percent channers

Reaction: pH 6.6 to 7.8

Reedwest Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, terrace, and swale on plain

Parent material: Loamy residuum weathered from sandstone and siltstone

Slope range: 0 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Reedwest loam, in an area of Reedwest-Castner complex, 2 to 8 percent slopes, in an area of rangeland, 200 feet south and 1,300 feet east of the northwest corner of sec. 33, T. 5 N., R. 15 E.; USGS Gougley Creek topographic quadrangle (lat. 46°08'48" N.; long. 109°51'25" W.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky, nonplastic; few medium and common very fine and fine roots; many very fine and fine pores; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bt1—6 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; common faint discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—13 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common very fine and fine pores; common distinct discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds and lining pores; slightly alkaline (pH 7.6); clear smooth boundary.

Bk—19 to 27 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 4/2) moist; moderate

medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine pores; common medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

Cr—27 to 60 inches; calcareous soft sandstone.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 11 to 30 inches

Depth to bedrock: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, sandy clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, sandy clay loam, fine sandy loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Rentsac Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, and knoll on plain

Parent material: Residuum weathered from calcareous sandstone

Slope range: 2 to 60 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Calcustepts

Typical Pedon

Rentsac channery loam, in an area of Yawdim-Rentsac-Cabbart complex, 2 to 15 percent slopes, in an area of pasture, 2,000 feet south and 400 feet west of the northeast corner of sec. 6, T. 3 N., R. 17 E.; USGS Gibson SW topographic quadrangle (lat. 46°02'21" N.; long. 109°39'14" W.)

A—0 to 2 inches; grayish brown (10YR 5/2) channery loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine pores; 15 percent sandstone channers; slightly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—2 to 5 inches; pale brown (10YR 6/3) channery loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common fine roots; common very fine and fine pores; few fine soft masses of lime; common carbonate coats on undersides of rock fragments; 20 percent sandstone channers; slightly effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bk2—5 to 16 inches; light gray (10YR 7/2) very channery fine sandy loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and medium roots; common fine soft masses of lime; common carbonate coats on undersides of rock fragments; 5 percent flagstones; 5 percent cobbles; 45 percent channers; strongly effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.

R—16 inches; hard calcareous sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 8 inches and the lithic contact
Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam or sandy loam
Clay content: 7 to 18 percent

Content of rock fragments: 0 to 60 percent gravel or channers

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, sandy loam, or fine sandy loam

Clay content: 7 to 18 percent

Content of rock fragments: 0 to 80 percent—0 to 30 percent flagstones or cobbles; 0 to 50 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 6.6 to 8.4

Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Loam, sandy loam, or fine sandy loam

Clay content: 7 to 18 percent

Content of rock fragments: 35 to 70 percent—0 to 35 percent flagstones or cobbles; 25 to 55 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Richey Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Fan, hill, stream terrace, terrace, and swale on plain

Parent material: Clayey alluvium

Slope range: 0 to 8 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Torreritic Haplustolls

Typical Pedon

Richey silty clay, 0 to 4 percent slopes, in an area of rangeland, 1,300 feet south and 500 feet west of the northeast corner of sec. 22, T. 5 N., R. 16 E.; USGS Jim Creek topographic quadrangle (lat. 46°10'20" N.; long. 109°41'48" W.)

A—0 to 7 inches; grayish brown (10YR 5/2) silty clay, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bw—7 to 13 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate coarse angular blocky structure parting to strong fine and medium angular blocky; very hard, firm, very sticky, very plastic; many fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk—13 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate coarse prismatic structure; very hard, firm, very sticky, very plastic; common fine roots; common very fine and fine pores; few fine and medium carbonate threads; strongly effervescent; strongly alkaline (pH 8.6); clear smooth boundary.

Bky—23 to 60 inches; light gray (2.5Y 7/2) silty clay, light olive brown (2.5Y 5/3) moist; moderate coarse prismatic structure; very hard, firm, very sticky, very plastic; few fine and medium roots; common very fine pores; few fine gypsum crystals; many fine and medium carbonate threads; strongly effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 41 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 12 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silty clay or clay loam

Clay content: 30 to 55 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silty clay or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 9.0

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silty clay or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bky horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Silty clay, clay loam, or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 0 to 4 mmhos/cm

Gypsum content: 1 to 5 percent

Reaction: pH 7.9 to 9.0

Rocko Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Gravelly colluvium

Slope range: 15 to 45 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Rocko cobbly loam, in an area of Rocko-Adel complex, 15 to 45 percent slopes, in an area of coniferous forest, 500 feet south and 800 feet west of the northeast corner of sec. 2, T. 2 N., R. 12 E.; USGS Raspberry Butte quadrangle (lat. 45°57'26" N.; long. 110°11'31" W.)

Oi—0 to 2 inches; slightly decomposed needles and twigs.

A—2 to 7 inches; dark gray (2.5Y 4/1) cobbly loam, black (2.5Y 2/1) moist; strong very fine and fine

granular structure; soft, very friable, nonsticky, nonplastic; common medium and coarse and many very fine and fine roots; many very fine and fine pores; 13 percent gravel; 7 percent cobbles; 3 percent stones; moderately acid (pH 6.0); clear smooth boundary.

E—7 to 11 inches; grayish brown (2.5Y 5/2) cobbly loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; common medium and coarse and many very fine and fine roots; many very fine and fine pores; 13 percent gravel; 13 percent cobbles; moderately acid (pH 6.0); gradual smooth boundary.

Bt1—11 to 26 inches; light yellowish brown (2.5Y 6/3) very cobbly sandy clay loam, olive brown (2.5Y 4/3) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine to coarse roots; few distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on rock fragments; 17 percent gravel; 13 percent cobbles; 7 percent stones; slightly acid (pH 6.2); gradual smooth boundary.

Bt2—26 to 35 inches; light yellowish brown (2.5Y 6/3) very cobbly clay loam, olive brown (2.5Y 4/3) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine to coarse roots; common distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and rock fragments; 23 percent gravel; 17 percent cobbles; 7 percent stones; slightly acid (pH 6.4); gradual wavy boundary.

Bt3—35 to 41 inches; light yellowish brown (2.5Y 6/4) very cobbly sandy clay loam, olive brown (2.5Y 4/3) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few medium and coarse roots; few distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on rock fragments; 23 percent gravel; 20 percent cobbles; 4 percent stones; neutral (pH 6.6); gradual wavy boundary.

BC—41 to 62 inches; light yellowish brown (2.5Y 6/4) very gravelly sandy clay loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few medium roots; 33 percent gravel; 10 percent cobbles; 13 percent stones; neutral (pH 6.6).

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 35 percent—
10 to 20 percent stones and cobbles; 5 to 15 percent gravel

Reaction: pH 5.6 to 7.3

E horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 40 percent—
10 to 20 percent stones and cobbles; 5 to 20 percent gravel

Reaction: pH 5.6 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy clay loam, clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—
20 to 30 percent stones and cobbles; 15 to 30 percent gravel

Reaction: pH 6.1 to 7.8

BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Sandy clay loam, sandy loam, or loam

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 70 percent—
20 to 35 percent stones and cobbles; 15 to 35 percent gravel

Reaction: pH 6.6 to 7.8

Roy Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Escarpment, fan, landslide, stream terrace, terrace

Parent material: Gravelly alluvium or gravelly glaciofluvial deposits

Slope range: 0 to 60 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Roy very gravelly loam, in an area of Roy-Tamaneen complex, 2 to 8 percent slopes, in an area of rangeland, 800 feet north and 1,500 feet west of the southeast corner of sec. 20, T. 5 N., R. 13 E. USGS Porcupine Butte topographic quadrangle (lat. 46°09'52" N.; long. 110°07'07" W.)

A—0 to 4 inches; brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; few fine and many very fine roots; few fine and common very fine pores; 13 percent cobbles; 31 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt1—4 to 10 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; few fine and common very fine roots; few fine and common very fine pores; common distinct dark brown (10YR 4/3) moist; clay films on faces of peds; 17 percent cobbles; 22 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt2—10 to 21 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; few faint dark brown (10YR 4/3) moist; clay films on faces of peds; 21 percent cobbles; 32 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bk—21 to 60 inches; light brownish gray (10YR 6/2) very cobbly clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; common carbonate coats on undersides of rock fragments; 25 percent cobbles; 15 percent gravel; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 16 inches

Depth to the Bk horizon: 20 to 40 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 12 to 40 percent

Content of rock fragments: 5 to 55 percent—5 to 20 percent stones and cobbles; 0 to 35 percent gravel

Reaction: pH 6.1 to 7.8

Bt1 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—15 to 40 percent stones and cobbles; 20 to 40 percent gravel

Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—15 to 40 percent stones and cobbles; 20 to 40 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Clay loam or sandy clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 35 to 80 percent—20 to 50 percent stones and cobbles; 15 to 30 percent gravel

Calcium carbonate equivalent: 2 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Roy Taxadjunct

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Landslide in foothills and mountains

Parent material: Clayey colluvium weathered from sandstone and shale

Slope range: 8 to 35 percent

Elevation range: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Mean annual air temperature: 39 to 43 degrees F

Frost-free period: 70 to 90 days

Taxonomic Class: Clayey-skeletal, smectitic, frigid Typic Argiustolls

The Roy soils as mapped in map unit 429E are taxadjunct to the series. They are outside the series range with a smectitic mineralogy class in the 10- to 40-inch particle size control section. Use and management are not significantly affected. Roy series classifies Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls.

Typical Pedon

Roy very stony clay loam, in an area of Work-Roy, bouldery-Bigsag family complex, 2 to 35 percent slopes, in an area of rangeland, 700 feet north and 1,500 feet east of the southwest corner of sec. 14, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°33'11" N.; long. 110°12'40" W.)

A1—0 to 4 inches; grayish brown (2.5Y 5/2) very stony clay loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel; 10 percent cobbles; 20 percent stones; 1 percent boulders; neutral (pH 6.8); clear smooth boundary.

A2—4 to 12 inches; grayish brown (2.5Y 5/2) very gravelly clay, very dark grayish brown (2.5Y 3/2) moist; weak fine and medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; many fine to coarse pores; 30 percent gravel; 5 percent cobbles; 5 percent stones; slightly effervescent; neutral (pH 6.8); clear smooth boundary.

Bt1—12 to 22 inches; grayish brown (2.5Y 5/2) very gravelly clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak fine granular; moderately hard, friable, moderately sticky, moderately plastic; common fine roots; common distinct dark brown (10YR 4/3) moist; clay films on faces of peds; many fine to coarse pores; 30 percent gravel; 5 percent cobbles; 5 percent stones; slightly acid (pH 6.4); clear smooth boundary.

Bt2—22 to 32 inches; grayish brown (2.5Y 5/2) extremely gravelly clay loam, brown (2.5Y 4/3) moist; weak fine granular structure; moderately hard, friable, moderately sticky, moderately plastic; few medium and common fine roots; common distinct dark yellowish brown (10YR 4/4) moist; clay films on faces of peds; many fine to coarse pores; 55 percent gravel; 10 percent cobbles; 5 percent stones; moderately acid (pH 5.8); clear smooth boundary.

C—32 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly clay loam, olive brown (2.5Y 4/3) moist; massive; moderately hard, friable, moderately sticky, moderately plastic; few fine and medium roots; many fine to coarse pores; 25 percent channers; 10 percent cobbles; 5 percent stones; moderately acid (pH 5.6).

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

A1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent boulders; 5 to 30 percent stones and cobbles; 10 to 25 percent gravel

Reaction: pH 6.1 to 7.3

A2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent boulders; 5 to 30 percent stones and cobbles; 10 to 25 percent gravel

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 55 percent

Content of rock fragments: 35 to 80 percent—15 to 40 percent stones and cobbles; 20 to 40 percent gravel

Reaction: pH 6.6 to 7.3

*C horizon**Hue:* 10YR or 2.5Y*Value:* 4 to 6 dry; 3 or 4 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam or clay*Clay content:* 35 to 55 percent*Content of rock fragments:* 35 to 80 percent—0 to 5 percent boulders; 10 to 30 percent stones and cobbles; 25 to 45 percent gravel*Reaction:* pH 6.6 to 7.3**Sagedale Series***Depth class:* Very deep (60 inches or more)*Drainage class:* Well drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Fan, hill, stream terrace, terrace, fan on escarpment, swale on escarpment, and swale on plain*Parent material:* Clayey alluvium weathered from shale and siltstone*Slope range:* 0 to 35 percent*Elevation range:* 3,900 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Mean annual air temperature:* 43 to 45 degrees F*Frost-free period:* 85 to 115 days**Taxonomic Class:** Fine, smectitic, frigid Typic Haplustepts**Typical Pedon**

Sagedale clay loam, in an area of Sagedale clay loam, 8 to 15 percent slopes, in an area of hayland, 2,000 south and 2,430 west of the northeast corner of sec. 29, T. 4 N., R. 14 E.; USGS Battleship Butte topographic quadrangle (lat. 46°04'11" N.; long. 110°00'23" W.)

Ap—0 to 4 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate thick platy structure; slightly hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; slightly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bw1—4 to 8 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate coarse angular blocky; slightly hard, friable, moderately sticky, moderately plastic; few medium and common very fine and fine roots; common very fine and fine pores; slightly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bw2—8 to 15 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; few medium and common very fine and fine roots; common very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk1—15 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; moderately hard, firm, very sticky, moderately plastic; common very fine and fine roots; common very fine and fine pores; few fine and medium soft masses and fine threads of lime; 5 percent gravel; strongly effervescent; strongly alkaline (pH 8.4); gradual smooth boundary.

Bk2—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; moderately hard, firm, very sticky, moderately plastic; few very fine and fine roots; common fine soft masses and threads of lime; 5 percent gravel; strongly effervescent; strongly alkaline (pH 8.4).

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the Bk horizon:* 10 to 18 inches*A horizon**Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam*Clay content:* 30 to 40 percent*Content of rock fragments:* 0 to 5 percent gravel*Reaction:* pH 7.4 to 8.4*Bw horizons**Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Clay loam, silty clay loam, or silty clay*Clay content:* 35 to 45 percent*Content of rock fragments:* 0 to 5 percent gravel*Reaction:* pH 7.4 to 8.4*Bk horizons**Hue:* 10YR or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Clay loam, silty clay loam, or silty clay*Clay content:* 35 to 45 percent

Content of rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

Sawicki Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Hill
Parent material: Gravelly alluvium, gravelly colluvium or gravelly till
Slope range: 4 to 25 percent
Elevation range: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Mean annual air temperature: 39 to 43 degrees F
Frost-free period: 70 to 90 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Sawicki very gravelly loam, in an area of Sawicki, extremely bouldery-Bowery complex, 4 to 25 percent slopes, in an area of rangeland, 900 feet south and 1,000 feet east of the northwest corner of sec. 35, T. 2 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°37'21" N.; long. 110°12'48" W.)

A—0 to 8 inches; very dark grayish brown (10YR 3/2) very gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; few medium and many very fine and fine roots; many very fine and fine pores; 25 percent gravel; 10 percent cobbles; 5 percent stones; slightly acid (pH 6.4); clear smooth boundary.

Bt1—8 to 15 inches; brown (10YR 4/3) very cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; 20 percent gravel; 17 percent cobbles; 3 percent stones; neutral (pH 6.8); clear smooth boundary.

Bt2—15 to 29 inches; brown (10YR 5/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine to medium roots; few very fine

pores; faint patchy dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; 27 percent gravel; 23 percent cobbles; 7 percent stones; neutral (pH 6.8); clear smooth boundary.

C—29 to 60 inches; light olive brown (2.5Y 5/4) extremely cobbly loam, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; 30 percent gravel; 30 percent subrounded cobbles; 7 percent stones; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 40 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Note: Some pedons have a BC horizon.

A horizon

Hue: 10YR or 2.5Y
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam
Clay content: 12 to 27 percent
Content of rock fragments: 10 to 50 percent—0 to 5 percent boulders; 5 to 20 percent stones and cobbles; 5 to 30 percent gravel
Reaction: pH 6.6 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam, sandy clay loam, or loam
Clay content: 20 to 30 percent
Content of rock fragments: 15 to 60 percent—10 to 35 percent stones and cobbles; 5 to 40 percent gravel
Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Sandy clay loam, sandy loam, or loam
Clay content: 15 to 25 percent
Content of rock fragments: 35 to 60 percent—15 to 45 percent stones and cobbles; 20 to 40 percent gravel
Reaction: pH 6.6 to 7.8

C horizon

Hue: 10YR or 2.5Y
Value: 4 to 7 dry; 3 to 6 moist
Chroma: 2 to 4

Texture (less than 2 mm): Loam, sandy loam, sandy clay loam, or loamy coarse sand
Clay content: 10 to 22 percent
Content of rock fragments: 35 to 70 percent—15 to 55 percent stones and cobbles; 20 to 40 percent gravel
Reaction: pH 6.6 to 7.8

Shambo Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Fan, hill, landslide, moraine, stream terrace, terrace, fan on escarpment, swale on escarpment, swale on plain
Parent material: Loamy alluvium
Slope range: 0 to 35 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Shambo loam, in an area of Shambo loam, 8 to 15 percent slopes, in an area of hayland, 500 feet south and 1,900 feet east of the northwest corner of sec. 21, T. 3 N., R. 13 E.; USGS Battleship Butte topographic quadrangle (lat. 46°00'06" N.; long. 110°06'56" W.)

- Ap—0 to 5 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many very fine pores; neutral (pH 7.2); clear smooth boundary.
- Bw1—5 to 10 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to moderate coarse subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine pores; slightly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
- Bw2—10 to 17 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate coarse subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few fine and common medium roots; common very fine pores;

5 percent gravel; strongly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.

- Bk1—17 to 29 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium roots; common very fine pores; 5 percent gravel; few fine soft masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.
- Bk2—29 to 38 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and medium roots; few very fine pores; 5 percent gravel; common fine soft masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.4); clear wavy boundary.
- Bck—38 to 60 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 4/2) moist; weak coarse subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; few fine roots; few very fine pores; 8 percent gravel; few fine threads of lime; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 15 inches
Depth to the Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y
Value: 3 to 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam or clay loam
Clay content: 10 to 35 percent
Content of rock fragments: 0 to 35 percent gravel
Reaction: pH 6.6 to 7.8

Bw horizons

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, silt loam, or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 5 percent gravel
Reaction: pH 6.6 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silt loam, silty clay loam, or loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 10 to 15 percent
Sodium adsorption ratio: 1 to 5
Reaction: pH 7.4 to 8.4

B_{Ck} horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam, silt loam, fine sandy loam, or loam
Clay content: 15 to 35 percent
Content of rock fragments: 0 to 15 percent gravel
Calcium carbonate equivalent: 5 to 10 percent
Sodium adsorption ratio: 1 to 5
Reaction: pH 7.4 to 8.4

Shawmut Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment, fan, hill, stream terrace, terrace, swale on fan, swale on moraine
Parent material: Gravelly alluvium or glacial fluvial deposits
Slope range: 0 to 60 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Shawmut gravelly loam, in an area of Shawmut gravelly loam, 2 to 8 percent slopes, in an area of rangeland, 800 feet north and 1,400 feet east of the southwest corner of sec. 6, T. 1 S., R. 16 E.; USGS Greycliff topographic quadrangle (lat. 45°46'12" N.; long. 109°48'06" W.)

A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; 20 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt—3 to 11 inches; very dark grayish brown (10YR 3/2) very gravelly clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; common very fine roots; common very fine and fine pores; many distinct discontinuous very dark brown (10YR 2/2) moist; clay films on faces of pedis; 35 percent gravel; neutral (pH 7.2); clear smooth boundary.

Btk—11 to 15 inches; grayish brown (10YR 5/2) very gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak very fine and fine subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; common very fine roots; common very fine and fine pores; common faint dark brown (10YR 3/3) moist; clay films on faces of pedis; common threads and soft masses of lime; 35 percent gravel; 5 percent cobbles; strongly effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—15 to 25 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; common carbonate coats on undersides of rock fragments; 45 percent gravel; 5 percent cobbles; violently effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

Bk2—25 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; common carbonate coats on undersides of rock fragments; 50 percent gravel; 15 percent cobbles; violently effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the calcic horizon: 10 to 20 inches
Note: Some pedons do not have a Btk horizon.

A horizon

Hue: 7.5YR or 10YR
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam

Clay content: 15 to 27 percent
Content of rock fragments: 15 to 80 percent—0 to 30 percent stones and cobbles; 15 to 50 percent gravel
Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 5 dry; 2 to 4 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 80 percent—0 to 35 percent stones and cobbles; 30 to 45 percent gravel
Reaction: pH 6.6 to 7.8

Btk horizon:

Hue: 7.5YR or 10YR
Value: 3 to 6 dry; 2 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam, loam, sandy clay loam, or sandy loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 80 percent—0 to 40 percent stones and cobbles; 30 to 60 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 6.6 to 7.9

Bk1 horizon

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy loam, sandy clay loam, or clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 35 to 80 percent—0 to 40 percent stones and cobbles; 30 to 60 percent gravel
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 10YR or 2.5Y
Value: 5 to 8 dry; 4 to 7 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy loam, or sandy clay loam
Clay content: 5 to 25 percent
Content of rock fragments: 50 to 85 percent—0 to 40 percent stones and cobbles; 45 to 70 percent gravel
Calcium carbonate equivalent: 10 to 25 percent
Reaction: pH 7.9 to 9.0

Sieben Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Fan, stream terrace, and terrace
Parent material: Gravelly alluvium
Slope range: 2 to 15 percent
Elevation range: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Calcic Argiustolls

Typical Pedon

Sieben gravelly loam, 1,900 feet south and 50 feet east of the northwest corner of sec. 15, T. 13 N., R. 4 W.; Lewis and Clark County, Montana.

A1—0 to 5 inches; grayish brown (10YR 5/2) gravelly loam, very grayish brown (10YR 3/2) moist; moderate very thin platy structure parting to moderate very fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; 20 percent angular gravel; slightly acid (pH 6.2); clear smooth boundary.

A2—5 to 9 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular and interstitial pores; 20 percent angular gravel; slightly acid (pH 6.2); clear smooth boundary.

Bt1—9 to 17 inches; pale brown (10YR 6/3) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, moderately sticky, moderately plastic; common very fine roots; many very fine tubular and interstitial pores; many distinct brown (10YR 5/3) clay films on faces of peds; 45 percent angular gravel; slightly acid (pH 6.4); gradual smooth boundary.

Bt2—17 to 21 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; common very fine roots; many very fine tubular and interstitial pores; few faint clay films on faces of peds and rock fragments; 55 percent angular

gravel; 5 percent angular cobbles; few faint carbonate coatings on undersides of rock fragments; slightly alkaline (pH 7.8); gradual smooth boundary.

Bk1—21 to 30 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; many very fine tubular and interstitial pores; 45 percent angular gravel; 10 percent angular cobbles; continuous distinct lime casts on undersides of fragments; many fine seams and masses of lime; violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

Bk2—30 to 41 inches; very pale brown (10YR 7/3) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; 55 percent angular gravel; 20 percent angular cobbles; continuous prominent lime casts on rock fragments; lime cemented sand and fine gravel on undersides of some fragments; violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

Bk3—41 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; 60 percent angular gravel; 15 percent angular cobbles; continuous faint lime casts on undersides of rock fragments; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 10 inches

Depth to the Bk horizon: 15 to 25 inches

A horizons

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 10 to 60 percent—0 to 10 percent stones; 0 to 20 percent angular cobbles; 10 to 30 percent angular gravel

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 3 or 4

Texture (less than 2 mm): Clay loam or sandy clay loam

Clay content: 30 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 0 to 5 percent angular cobbles; 35 to 50 percent angular gravel

Reaction: pH 6.6 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry

Chroma: 3 or 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 40 to 70 percent—0 to 5 percent angular cobbles; 35 to 65 percent angular gravel

Reaction: pH 6.6 to 7.8

Bk1 and Bk2 horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, sandy loam, or coarse sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 50 to 80 percent—5 to 20 percent angular cobbles; 45 to 60 percent angular gravel

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

Bk3 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 5 to 15 percent

Content of rock fragments: 50 to 80 percent—5 to 20 percent angular cobbles; 45 to 60 percent angular gravel

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.4 to 8.4

Sinnigam Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Hill

Parent material: Clayey residuum weathered from sandstone and shale

Slope range: 15 to 45 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 85 to 115 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Lithic Argiustolls

Typical Pedon

Sinnigam very channery clay loam, in an area of Sinnigam-Wayden complex, moist, 15 to 45 percent slopes, in an area of coniferous forest, 2,500 feet north and 1,850 feet east of the southwest corner of sec. 11, T. 1 S., R. 16 E.; USGS Lone Indian Butte topographic quadrangle (lat. 45°45'42" N.; long. 109°43'08" W.)

Oi—0 to 1 inch; slightly decomposed needles, twigs, and grass.

A—1 to 5 inches; grayish brown (10YR 5/2) very channery clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, moderately plastic; many very fine and fine roots; many fine pores; 40 percent channers; neutral (pH 6.6); abrupt smooth boundary.

Bt1—5 to 12 inches; grayish brown (10YR 5/2) very channery clay, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, very sticky, moderately plastic; many very fine and fine roots; common medium and many fine pores; many distinct continuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds and rock fragments; 40 percent channers; 5 percent cobbles; neutral (pH 6.8); clear smooth boundary.

Bt2—12 to 19 inches; pale brown (10YR 6/3) very channery clay, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; very hard, firm, very sticky, very plastic; many very fine and fine roots; common medium pores; common distinct discontinuous brown (10YR 5/3) moist; clay films on faces of peds and rock fragments; 45 percent channers; 10 percent cobbles; neutral (pH 7.2); abrupt wavy boundary.

R—19 inches; hard, fractured argillaceous sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 12 inches
Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR or 10YR
Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 5 to 50 percent—0 to 30 percent stones and cobbles; 5 to 40 percent channers

Reaction: pH 6.1 to 7.8

Bt1 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay, silty clay, or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 70 percent—5 to 20 percent stones and cobbles; 30 to 60 percent channers

Reaction: pH 6.1 to 7.8

Bt2 horizon

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay, silty clay, or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 70 percent—5 to 20 percent stones and cobbles; 30 to 65 percent channers

Reaction: pH 6.1 to 7.8

Sixbeacon Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 24 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Fan, stream terrace, terrace, and fan on escarpment

Parent material: Gravelly alluvium

Slope range: 2 to 60 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Sixbeacon gravelly loam, 100 feet north and 1,000 feet west of the southeast corner of sec. 23, T. 8 N., R. 9 W.; Powell County, Montana.

Ap—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many fine irregular pores; 15 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

Bw—4 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine roots; many very fine and fine tubular pores; 5 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bk1—10 to 12 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine pores; 10 percent gravel; disseminated lime; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

2Bk2—12 to 24 inches; white (10YR 8/2) very gravelly sandy loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine roots; many very fine and fine tubular pores; 50 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

3Bk3—24 to 60 inches; light gray (10YR 7/2) extremely gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky, nonplastic; few fine roots; many fine irregular pores; 60 percent gravel; 10 percent cobbles; disseminated lime; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 41 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 8 to 13 inches

Ap horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.1 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 19 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry, 4 to 7 moist

Chroma: 1 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 20 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent gravel

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 6.6 to 8.4

2Bk2 horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 6 or 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent cobbles; 35 to 50 percent gravel

Calcium carbonate equivalent: 20 to 40 percent

Reaction: pH 7.9 to 8.4

3Bk3 horizon

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand, sandy loam, or loam

Clay content: 0 to 7 percent

Content of rock fragments: 50 to 80 percent—10 to 20 percent cobbles; 40 to 60 percent gravel

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Soapcreek Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Flood plain and flood-plain step

Parent material: Clayey alluvium

Slope range: 0 to 2 percent

Elevation range: 3,750 to 6,200 feet

Mean annual precipitation: 10 to 20 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 125 days

Taxonomic Class: Fine, mixed, superactive, frigid
Fluvaquentic Haplustolls

Typical Pedon

Soapcreek clay loam, in an area of Soapcreek clay loam, 0 to 2 percent slopes, in an area of hayland, 800 feet south and 400 feet west of the northeast corner of sec. 19, T. 4 N., R. 15 E.; USGS Melville topographic quadrangle (lat. 46°05'14" N.; long. 109°53'47" W.)

Ap—0 to 4 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; common medium and many very fine and fine roots; many very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

A1—4 to 8 inches; gray (2.5Y 5/1) clay loam, very dark gray (2.5Y 3/1) moist; moderate medium angular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; common medium and many very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

A2—8 to 14 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; very hard, firm, very sticky, very plastic; common medium and many very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk—14 to 25 inches; gray (10YR 6/1) silty clay, dark gray (10YR 4/1) moist; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; very hard, firm, very sticky, very plastic; few medium and common very fine and fine roots; common very fine and fine pores; common fine irregular masses of lime; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bkg—25 to 34 inches; gray (2.5Y 6/1) clay, dark gray (2.5Y 4/1) moist; common medium prominent olive yellow (2.5Y 6/8) moist, redox concentrations; moderate coarse prismatic structure; very hard, firm, very sticky, very plastic; few medium and common fine roots; many fine and medium irregular masses of lime; violently effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bg1—34 to 48 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; common medium and coarse prominent olive yellow (2.5Y 6/6) moist, redox concentrations; weak coarse prismatic structure; very hard, friable, slightly

sticky, slightly plastic; few fine roots; 10 percent gravel; violently effervescent; slightly alkaline (pH 7.6); clear smooth boundary.

2Cg—48 to 60 inches; olive gray (5Y 5/2) very gravelly sandy clay loam, olive gray (5Y 4/2) moist; common medium and coarse prominent olive yellow (2.5Y 6/6) moist, redox concentrations; massive; very hard, friable, moderately sticky, moderately plastic; 35 percent gravel; 5 percent cobbles; violently effervescent; slightly alkaline (pH 7.6).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 10 to 15 inches

Depth to the seasonal high water table: 24 to 42 inches

Depth to the 2Cg horizon: Greater than 40 inches

Note: Some pedons do not have a 2Cg horizon.

A horizons

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Texture (less than 2 mm): Silty clay or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Bkg horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 moist

Chroma: 1 or 2

Redox concentrations: Few to many; chroma of 6 or 8

Texture (less than 2 mm): Clay, silty clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent gravel

Calcium carbonate equivalent: 1 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

*Bg horizon**Hue:* 2.5Y or 5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 1 or 2*Redox concentrations:* Few to many; chroma of 6 or 8*Redox depletions:* None to common; chroma of 0 or 1*Texture (less than 2 mm):* Clay loam, silty clay, or clay*Clay content:* 25 to 45 percent*Content of rock fragments:* 0 to 15 percent gravel*Calcium carbonate equivalent:* 1 to 15 percent*Electrical conductivity:* 0 to 4 mmhos/cm*Reaction:* pH 7.4 to 8.4*2Cg horizon:**Hue:* 2.5Y or 5Y*Value:* 5 to 7 dry; 4 or 5 moist*Chroma:* 1 or 2*Redox concentrations:* Few to many; chroma of 6 or 8*Redox depletions:* None to common; chroma of 0 or 1*Texture (less than 2 mm):* Sandy clay loam, clay loam, or clay*Clay content:* 25 to 45 percent*Content of rock fragments:* 15 to 60 percent—0 to 10 percent cobbles; 15 to 50 percent gravel*Calcium carbonate equivalent:* 1 to 15 percent*Electrical conductivity:* 0 to 4 mmhos/cm*Reaction:* pH 7.4 to 8.4**Stemple Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate (0.6 to 2.0 inches/hour)*Landform:* Mountain*Parent material:* Gravelly colluvium or gravelly till*Slope range:* 25 to 70 percent*Elevation range:* 5,500 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Mean annual air temperature:* 36 to 38 degrees F*Frost-free period:* 50 to 70 days**Taxonomic Class:** Loamy-skeletal, mixed, superactive Typic Palecryalfs**Typical Pedon**

Stemple very cobbly loam, in an area of Stemple-Worock complex, 35 to 70 percent slopes, very stony, in an area of coniferous forest, 700 feet north and 2,000 feet east of the southwest corner of sec. 19,

T. 3 S., R. 13 E.; USGS McLeod Basin topographic quadrangle (lat. 45°33'18" N.; long. 110°10'07" W.)

Oi—0 to 2 inches; partially decayed needles and twigs.

E1—2 to 8 inches; brown (10YR 5/3) very cobbly loam, brown (10YR 4/3) moist; weak medium platy structure parting to weak fine and medium granular; soft, very friable, nonsticky, nonplastic; common medium and many very fine and fine roots; common very fine and fine pores; 15 percent gravel; 15 percent cobbles; 5 percent stones; moderately acid (pH 6.0); clear wavy boundary.

E2—8 to 28 inches; light gray (10YR 7/2) very cobbly loam, light brownish gray (10YR 6/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine pores; 20 percent gravel; 25 percent cobbles; 5 percent stones; slightly acid (pH 6.4); clear wavy boundary.

E/Bt—28 to 37 inches; E part (70 percent) light gray (10YR 7/2) very cobbly loam, light brownish gray (10YR 6/2) moist tongues; Bt part (30 percent) yellowish brown (10YR 5/6) very cobbly sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak fine and medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; 20 percent gravel; 25 percent cobbles; 5 percent stones; neutral (pH 6.6); gradual smooth boundary.

Bt—37 to 62 inches; yellowish brown (10YR 5/6) very cobbly sandy clay loam, dark yellowish brown (10YR 4/6) moist; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine pores; common distinct discontinuous brown (7.5YR 4/4) moist; clay films on faces of peds and rock fragments; 20 percent gravel; 20 percent cobbles; 5 percent stones; neutral (pH 6.6).

Range in Characteristics*Soil temperature:* 36 to 42 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the Bt horizon:* 25 to 50 inches*E1 horizon**Hue:* 7.5YR, 10YR, or 2.5Y*Value:* 5 to 7 dry; 4 to 6 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Loam or sandy loam

Clay content: 10 to 20 percent
Content of rock fragments: 20 to 60 percent—5 to 25 percent stones, flagstones, or cobbles; 15 to 45 percent gravel or channers
Reaction: pH 5.1 to 6.5

E2 horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam or sandy loam
Clay content: 10 to 20 percent
Content of rock fragments: 35 to 80 percent—15 to 30 percent stones, flagstones, or cobbles; 20 to 60 percent gravel or channers
Reaction: pH 5.1 to 6.5

E/Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y
Value: E part—6 or 7, Bt part—5 or 6 dry; E part—4 to 6, Bt part—4 or 5 moist
Chroma: E part—2 or 3; Bt part—4 to 6
Texture (less than 2 mm): Loam, clay loam, or sandy clay loam
Clay content: 15 to 30 percent
Content of rock fragments: 35 to 80 percent—15 to 40 percent stones, flagstones, or cobbles; 20 to 40 percent gravel
Reaction: pH 5.1 to 7.3

Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Texture (less than 2 mm): Sandy clay loam or clay loam
Clay content: 27 to 35 percent
Content of rock fragments: 35 to 80 percent—0 to 10 percent stones and flagstones; 15 to 30 percent cobbles; 20 to 40 percent gravel
Reaction: pH 5.6 to 7.3

Swampcreek Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Poorly drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Flood plain, stream terrace, swale on terrace
Parent material: Loamy over gravelly alluvium
Slope range: 0 to 4 percent
Elevation range: 3,750 to 6,000 feet
Mean annual precipitation: 10 to 19 inches

Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 85 to 130 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Endoaquolls

Typical Pedon

Swampcreek gravelly sandy clay loam, in an area of Roy-Swampcreek complex, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet south and 100 feet east of the northwest corner of sec. 32, T. 5 N., R. 14 E.; USGS Porcupine Butte topographic quadrangle (lat. 46°08'36" N.; long. 110°00'28" W.)

A—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, moderately plastic; many very fine to medium roots; common very fine and fine pores; 5 percent cobbles; 25 percent gravel; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bw—8 to 18 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; common medium and coarse prominent strong brown (7.5YR 5/6) moist, redox concentrations; few fine distinct gray (10YR 5/1) moist, redox depletions; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine and many medium roots; common very fine and fine pores; 10 percent gravel; moderately alkaline (pH 7.2); gradual smooth boundary.

2Bkg1—18 to 30 inches; grayish brown (2.5Y 5/2) very gravelly coarse sandy loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct dark yellowish brown (10YR 4/6) moist, redox concentrations; weak fine and medium angular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and medium roots; few medium and many very fine and fine pores; common fine irregular masses of lime; common distinct carbonate coats on undersides of rock fragments; 35 percent gravel; 5 percent cobbles; strongly effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

3Bkg2—30 to 60 inches; light gray (5Y 6/1) extremely gravelly loamy coarse sand, olive gray (5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; few fine roots; common fine soft masses of lime; common distinct carbonate coats on undersides

of rock fragments; 50 percent gravel; 15 percent cobbles; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 14 inches

Depth to the 3Bk horizon: 20 to 40 inches

Depth to the seasonal high water table: 8 to 24 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Sandy clay loam or loam

Clay content: 18 to 35 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent cobbles; 15 to 30 percent gravel

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2

Redox concentrations: Few to many; chroma of 6 or 8

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Loam, sandy clay loam, or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel

Reaction: pH 6.6 to 8.4

2Bkg horizon

Hue: 2.5Y or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 or 2

Redox concentrations: Few to many; chroma of 6 or 8

Redox depletions: None to common; chroma of 0 or 1

Texture (less than 2 mm): Coarse sandy loam, sandy loam, or loam

Clay content: 5 to 20 percent

Content of rock fragments: 35 to 60 percent—5 to 15 percent cobbles; 30 to 45 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

3Bkg horizon

Hue: 5Y, 2.5Y, or N

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 0 to 2

Texture (less than 2 mm): Loamy coarse sand, sand, coarse sand, or loamy sand

Clay content: 1 to 10 percent

Content of rock fragments: 50 to 80 percent—0 to 15 percent stones; 10 to 25 percent cobbles; 40 to 55 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Sweetgrass Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 28 inches = moderately slow (0.2 to 0.6 inch/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Fan and terrace

Parent material: Clayey over sandy and gravelly alluvium

Slope range: 0 to 8 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Clayey over sandy or sandy-skeletal, smectitic over mixed, frigid Typic Argiustolls

Typical Pedon

Sweetgrass gravelly loam, in an area of Sweetgrass gravelly loam, 0 to 4 percent slopes, in an area of rangeland, 1,450 feet south and 2,400 feet east of the northwest corner of sec. 27, T. 1 N., R. 14 E.; USGS Big Timber topographic quadrangle (lat. 45°48'39" N.; long. 109°58'11" W.)

A—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; 15 percent gravel; 2 percent cobbles; slightly alkaline (pH 7.4); abrupt smooth boundary.

Bt—7 to 13 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to weak fine subangular blocky; moderately hard, friable,

moderately sticky, moderately plastic; many continuous distinct dark brown (7.5YR 3/2) moist; clay films on faces of peds and lining pores; few fine and medium roots; many very fine pores; 1 percent gravel; slightly alkaline (pH 7.6); abrupt smooth boundary.

2Bk1—13 to 19 inches; light gray (10YR 7/2) sandy clay loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; common fine pores; common large masses of lime; 5 percent gravel; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

2Bk2—19 to 28 inches; white (10YR 8/2) gravelly sandy loam, light gray (10YR 7/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; common fine and medium pores; common large masses of lime; many distinct carbonate coats on rock fragments; 15 percent gravel; 5 percent cobbles; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

3Bk3—28 to 43 inches; light gray (10YR 7/2) very gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; continuous distinct carbonate coats on undersides of rock fragments; 35 percent gravel; 10 percent cobbles; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

3C—43 to 60 inches; pale brown (10YR 6/3) extremely gravelly coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky, nonplastic; few distinct carbonate coats on undersides of rock fragments; 45 percent gravel; 20 percent cobbles; 10 percent stones; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the 2Bk horizon: 10 to 20 inches

Depth to the 3Bk horizon: 20 to 40 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, clay loam, or clay

Clay content: 20 to 50 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR or 10YR

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Reaction: pH 6.6 to 7.8

2Bk horizons

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy clay loam, loam, clay loam, or sandy loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel

Calcium carbonate equivalent: 15 to 50 percent

Reaction: pH 7.4 to 8.4

3Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy coarse sand, loamy sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 15 percent stones; 5 to 25 percent cobbles; 30 to 45 percent gravel

Calcium carbonate equivalent: 5 to 20 percent

Reaction: pH 7.4 to 8.4

3C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Coarse sand, sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 15 percent stones; 5 to 25 percent cobbles; 30 to 45 percent gravel

Calcium carbonate equivalent: 5 to 20 percent
Reaction: pH 7.4 to 8.4

Sweetweed Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Hill
Parent material: Loamy alluvium or colluvium
Slope range: 25 to 60 percent
Elevation range: 3,900 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustalfs

Typical Pedon

Sweetweed loam, in an area of Vision-Sweetweed-Whitlash complex, 25 to 60 percent slopes, in an area of coniferous forest, 800 feet north and 2,400 feet east of the southwest corner of sec. 3, T. 2 S., R. 15 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°41'02" N.; long. 109°51'40" W.)

Oi—0 to 1 inch; partially decomposed twigs and needles; moderately acid (pH 6.0).

A—1 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; 2 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

E/Bt—7 to 15 inches; E part (75 percent) light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist tongues; Bt part (25 percent) pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine pores; common faint patchy dark yellowish brown (10YR 4/4) moist; clay films on subangular blocks of the Bt horizon; 2 percent gravel; moderately acid (pH 6.2); clear smooth boundary.

Bt1—15 to 27 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; many very fine and fine pores; common

faint discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; 5 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

Bt2—27 to 46 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; 5 percent gravel; slightly acid (pH 6.4); gradual smooth boundary.

BC—46 to 61 inches; very pale brown (10YR 7/3) channery loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and coarse roots; many very fine and fine pores; 15 percent channers; 5 percent cobbles; slightly acid (pH 6.4).

Range in Characteristics

Soil temperature: 38 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Note: Some pedons do not have a BC horizon.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 6.5

E/Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: E part—5 to 7 dry, 4 or 5 moist; Bt part—4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, clay loam, or sandy clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 5 to 15 percent gravel
Reaction: pH 5.6 to 7.3

BC horizon:

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, sandy loam, or fine sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent gravel or channers
Reaction: pH 5.6 to 7.3

Tamaneen Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour)
Landform: Fan, stream terrace, and terrace
Parent material: Clayey over gravelly alluvium or clayey over gravelly glaciofluvial deposits
Slope range: 0 to 8 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine, smectitic, frigid Typic Argiustolls

Typical Pedon

Tamaneen gravelly loam, in an area of Tamaneen gravelly loam, 0 to 2 percent slopes, in an area of rangeland, 1,200 feet north and 2,600 feet west of the southeast corner of sec. 14, T. 1 S., R. 14 E.; USGS Ross Canyon topographic quadrangle (lat. 45°44'39" N.; long. 109°57'37" W.)

A—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine granular structure; moderately hard, friable, slightly sticky, slightly plastic; many very fine to coarse roots; 15 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

Bt—7 to 14 inches; brown (10YR 4/3) clay loam, very dark brown (10YR 3/3) moist; strong medium subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine and fine roots; many very fine to medium pores; common distinct discontinuous dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; neutral (pH 7.2); clear wavy boundary.

Bk1—14 to 28 inches; very pale brown (10YR 8/2) clay loam, light brownish gray (10YR 6/2) moist; moderate fine and medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; few very fine and fine pores; medium and coarse soft masses of lime; violently effervescent; strongly alkaline (pH 8.6); abrupt smooth boundary.

2Bk2—28 to 42 inches; light gray (10YR 7/2) very gravelly loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; common continuous carbonate coats on rock fragments; 30 percent gravel; 10 percent cobbles; violently effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

2Bk3—42 to 60 inches; light gray (10YR 7/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common continuous carbonate coats rock fragments; 35 percent gravel; 15 percent cobbles; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 15 inches
Depth to the Bk horizon: 10 to 16 inches
Depth to the 2Bk horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Loam or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent gravel
Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel

Reaction: pH 6.6 to 7.8

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay, or silty clay loam

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent gravel

Calcium carbonate equivalent: 20 to 30 percent

Reaction: pH 7.4 to 9.0

2Bk2 horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 20 to 45 percent—0 to 10 percent cobbles; 20 to 35 percent gravel

Calcium carbonate equivalent: 25 to 40 percent

Reaction: pH 7.9 to 9.0

2Bk3 horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 5 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam, sandy clay loam, or loam

Clay content: 8 to 25 percent

Content of rock fragments: 50 to 80 percent—5 to 20 percent cobbles; 35 to 60 percent gravel

Calcium carbonate equivalent: 25 to 40 percent

Reaction: pH 7.9 to 9.0

Tanna Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Escarpment, fan, hill, strath terrace, terrace, and swale on plain

Parent material: Clayey residuum weathered from sandstone and shale

Slope range: 2 to 35 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Fine, smectitic, frigid Aridic Argiustolls

Typical Pedon

Tanna clay loam, in an area of Tanna-Hinterland clay loams, 2 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 2,100 feet west of the southeast corner of sec. 23, T. 1 N., R. 16 E.; USGS Lone Indian Butte topographic quadrangle (lat. 45°49'07" N.; long. 109°41'56" W.)

A—0 to 5 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine pores; neutral (pH 6.8); abrupt smooth boundary.

Bt1—5 to 12 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common fine pores; continuous distinct dark brown (10YR 4/3) moist; clay films on faces of peds; neutral (pH 7.0); gradual smooth boundary.

Bt2—12 to 19 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few fine roots; few fine pores; many distinct brown (10YR 4/3) moist; clay films on faces of peds; slightly alkaline (pH 7.4); clear smooth boundary.

Bk—19 to 27 inches; light brownish gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure; moderately hard, firm, slightly sticky, slightly plastic; few fine roots; few very fine pores; common fine threads of lime; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Cr—27 to 60 inches; semiconsolidated shale interbedded with layers of sandstone.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 10 to 20 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon*Hue:* 10YR or 2.5Y*Value:* 5 dry; 2 or 3 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam*Clay content:* 27 to 35 percent*Content of rock fragments:* 0 to 25 percent gravel or channers*Calcium carbonate equivalent:* 0 to 10 percent*Reaction:* pH 6.6 to 7.8**Bt horizons***Hue:* 10YR or 2.5Y*Value:* 4 to 6 dry; 3 or 4 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, clay, or silty clay*Clay content:* 35 to 50 percent*Content of rock fragments:* 0 to 10 percent gravel or channers*Electrical conductivity:* 0 to 4 mmhos/cm*Reaction:* pH 6.6 to 8.4**Bk horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 or 3*Texture (less than 2 mm):* Clay loam, silty clay loam, or clay*Clay content:* 25 to 45 percent*Content of rock fragments:* 0 to 15 percent gravel or channers*Calcium carbonate equivalent:* 5 to 15 percent*Electrical conductivity:* 0 to 4 mmhos/cm*Reaction:* pH 7.4 to 8.4**Thibadeau Series***Depth class:* Very deep (greater than 60 inches)*Drainage class:* Somewhat poorly drained*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)*Landform:* Flood plain*Parent material:* Loamy alluvium*Slope range:* 0 to 4 percent*Elevation range:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Mean annual air temperature:* 43 to 46 degrees F*Frost-free period:* 95 to 125 days**Taxonomic Class:** Fine-loamy, mixed, superactive, calcareous, frigid Oxyaquic Ustifluvents**Typical Pedon**

Thibadeau clay loam, in an area of rangeland, 1,600 feet north and 600 feet east of the southwest

corner of sec. 11, T. 35 N., R. 12 E.; Hill County, Montana.

A—0 to 2 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; soft, very friable, moderately sticky, moderately plastic; many very fine roots; common very fine pores; strongly alkaline (pH 8.8); clear smooth boundary.**C**—2 to 14 inches; grayish brown (2.5Y 5/2) clay loam consisting of thin layers of loam and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; common very fine pores; strongly effervescent; strongly alkaline (pH 8.8); clear wavy boundary.**Cyz**—14 to 60 inches; light olive brown (2.5Y 5/4) clay loam consisting of thin layers of loam and fine sandy loam, olive brown (2.5Y 4/4) moist; many fine distinct yellowish brown (10YR 5/6) dry redox concentrations below 20 inches and few faint above 20 inches; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine pores; common fine masses and seams of gypsum and other salts; strongly effervescent; very strongly alkaline (pH 9.6).**Range in Characteristics***Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the seasonal high water table:* 24 to 42 inches*Note:* Gypsum and other salts are inherent in the parent material.**A horizon***Hue:* 10YR or 2.5Y*Value:* 5 to 7 dry; 3 to 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Loam or clay loam*Clay percent:* 15 to 35 percent*Calcium carbonate equivalent:* 1 to 5 percent*Electrical conductivity:* 8 to 16 mmhos/cm*Sodium adsorption ratio:* 0 to 4*Reaction:* pH 7.4 to 9.0**C horizon***Hue:* 10YR or 2.5Y*Value:* 5 or 6 dry; 4 or 5 moist*Chroma:* 2 to 4*Texture (less than 2 mm):* Clay loam, loam, or silty clay loam with or without thin strata of loam, clay loam, silty clay loam, fine sandy loam, or silt loam*Clay content:* 18 to 35 percent

Calcium carbonate equivalent: 1 to 5 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 0 to 20

Reaction: pH 7.4 to 9.0

Cyz horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Clay loam, loam, or silty clay loam with or without thin strata of fine sandy loam, loam, clay loam, silty clay loam, or silt loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 1 to 5 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 0 to 30

Gypsum content: 2 to 5 percent

Reaction: pH 7.4 to 9.0

Tiban Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Stream terrace

Parent material: Gravelly colluvium

Slope range: 0 to 8 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 43 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Tiban gravelly loam, in an area of Bearmouth-Tiban-Beehive complex, 0 to 8 percent slopes, in an area of coniferous forest, 1,700 feet south and 900 feet west of the northeast corner of sec. 25, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°32'56" N.; long. 110°03'24" W.)

A—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, black (10YR 2/1) moist; weak very fine and fine granular structure; soft, very friable, nonsticky, slightly plastic; common medium and many very fine and fine roots; many very fine and fine pores; 15 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

Bw—3 to 10 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky,

slightly plastic; few medium and many very fine and fine roots; many very fine and fine pores; 25 percent gravel; 5 percent cobbles; slightly alkaline (pH 7.4); clear wavy boundary.

Bk—10 to 60 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; 35 percent gravel; 10 percent cobbles; carbonate coats on undersides of rock fragments; many fine and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.2).

Range in Characteristics

Soil temperature: 36 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 10 to 24 inches

Note: Some pedons have a C horizon.

A horizon

Hue: 7.5YR or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 70 percent—0 to 30 percent stones and cobbles; 15 to 40 percent gravel or channers

Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 7.5YR or 10YR

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 15 to 60 percent—0 to 20 percent stones and cobbles; 15 to 40 percent gravel or channers

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 7.5YR or 10YR

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 80 percent—5 to 20 percent stones and cobbles; 30 to 60 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Tibson Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Landslide, moraine, and mountain

Parent material: Gravelly till

Slope range: 4 to 70 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Calcic Haplocryolls

Typical Pedon

Tibson gravelly loam, in an area of Tibson, extremely bouldery-Bridger, extremely bouldery-Adel complex, 8 to 35 percent slopes, extremely bouldery, in an area of rangeland, 100 feet north and 1,600 feet east of the southwest corner of sec. 13, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°34'06" N.; long. 110°04'03" W.)

A—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine pores; 15 percent gravel; 5 percent cobbles; slightly alkaline (pH 7.6); abrupt wavy boundary.

Bk1—7 to 19 inches; pale brown (10YR 6/3) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common fine and many very fine roots; common very fine and fine pores; few fine and medium soft masses of lime; 25 percent gravel; 10 percent cobbles; violently effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

Bk2—19 to 31 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; few very fine and fine pores; common fine and medium masses of lime; 25 percent gravel; 15 percent cobbles; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Bk3—31 to 60 inches; very pale brown (10YR 8/3) very gravelly loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; soft, friable, slightly sticky, slightly plastic; few very fine and

fine roots; few very fine and fine pores; many fine and medium masses of lime; 30 percent gravel; 15 percent cobbles; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 37 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon: 6 to 12 inches

Note: Some pedons have a Bw horizon.

A horizon

Hue: 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 60 percent—0 to 15 percent stones and cobbles; 15 to 45 percent gravel or channers

Reaction: pH 7.4 to 7.8

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 35 to 60 percent—0 to 25 percent stones and cobbles; 20 to 50 percent gravel or channers

Calcium carbonate equivalent: 20 to 35 percent

Reaction: pH 7.9 to 8.4

Bk2 and Bk3 horizons

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 35 to 60 percent—0 to 25 percent stones and cobbles; 20 to 50 percent gravel or channers

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

Ticell Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill and knoll on plain

Parent material: Residuum weathered from calcareous sandstone or sandstone and siltstone

Slope range: 2 to 35 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy, mixed, superactive, frigid
Lithic Calciustolls

Typical Pedon

Ticell loam, in an area of Ticell-Castner complex, 2 to 15 percent slopes, in an area of rangeland, 400 feet south and 400 feet west of the northeast corner of sec. 21, T. 5 N., R. 15 E.; USGS Gougley Creek topographic quadrangle (lat. 46°10'28" N.; long. 109°50'34" W.)

- A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam, dark olive brown (2.5Y 3/3) moist; weak fine and medium granular structure; slightly hard, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 3 percent cobbles; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.
- A2—4 to 8 inches; light olive brown (2.5Y 5/3) loam, dark olive brown (2.5Y 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; strongly effervescent; slightly alkaline (pH 7.8); abrupt wavy boundary.
- Bk1—8 to 12 inches; pale yellow (2.5Y 8/2) silt loam, light brownish gray (2.5Y 6/2) moist; weak medium subangular blocky structure; moderately hard, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; common very fine and fine pores; common fine and medium masses of lime; 3 percent gravel; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.
- Bk2—12 to 17 inches; white (2.5Y 8/1) silt loam, light brownish gray (2.5Y 6/2) moist; weak fine and medium platy structure parting to moderate medium subangular blocky; very hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; many fine and medium masses of lime; 10 percent gravel; violently effervescent; moderately alkaline (pH 8.4); abrupt wavy boundary.
- R—17 inches; unweathered bedrock, calcareous sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 5 to 10 inches

Depth to bedrock: 10 to 20 inches

A horizons

Hue: 10YR or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 10 to 22 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 1 to 4

Texture (less than 2 mm): Silt loam or loam

Clay content: 10 to 22 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Timberlin Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Mountain

Parent material: Loamy colluvium and/or residuum weathered from tuff breccia

Slope range: 8 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Timberlin gravelly loam, in an area of Adel-Timberlin complex, 8 to 35 percent slopes, in an area of coniferous forest, 2,200 feet south and 2,500 feet east of the northwest corner of sec. 12, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°35'27" N.; long. 110°03'50" W.)

Oi—0 to 1 inch; slightly decomposed needles, twigs, and leaves.

A1—1 to 3 inches; dark gray (10YR 4/1) gravelly loam, black, (10YR 2/1) moist; weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; many fine and medium roots; many very fine and fine pores; 20 percent gravel; slightly acid (pH 6.2); abrupt smooth boundary.

A2—3 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, black (10YR 2/1) moist; weak thin platy structure parting to weak fine and medium subangular blocky; soft, very friable, nonsticky, nonplastic; many fine and medium roots; many very fine and fine pores; 25 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

E—6 to 12 inches; grayish brown (10YR 5/2) gravelly loam, dark gray (10YR 4/1) moist; weak medium platy structure parting to weak medium subangular blocky; soft, very friable, slightly sticky, slightly plastic; few coarse and many fine and medium roots; many very fine and fine pores; 30 percent gravel; slightly acid (pH 6.2); gradual smooth boundary.

Bt1—12 to 22 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many fine and medium roots; many very fine and fine pores; common distinct discontinuous dark brown (7.5YR 3/4) moist; clay films on faces of peds and lining pores; 40 percent gravel; 5 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt2—22 to 33 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few coarse and common fine and medium roots; many very fine and fine pores; common distinct discontinuous dark brown (7.5YR 3/4) moist; clay films on faces of peds and lining pores; 45 percent gravel; 10 percent cobbles; coarse fragments increasing with depth; neutral (pH 6.8); abrupt smooth boundary.

R—33 to 61 inches; unweathered bedrock; hard sandstone and gabbro.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to bedrock: 20 to 40 inches

Note: Some pedons do not have an E horizon.

A horizons

Hue: 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 20 percent stones and cobbles; 5 to 20 percent gravel or channers

Reaction: pH 6.1 to 7.3

E horizon:

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 40 percent—0 to 20 percent stones and cobbles; 15 to 30 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Loam, sandy clay loam, or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—10 to 30 percent stones and cobbles; 30 to 45 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture (less than 2 mm): Loam, sandy clay loam, or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 70 percent—10 to 30 percent stones and cobbles; 30 to 45 percent gravel or channers

Reaction: pH 6.1 to 7.3

Tongue River Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Loamy colluvium and/or residuum weathered from sandstone and siltstone

Slope range: 15 to 60 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Eutric Haplocryalfs

Typical Pedon

Tongue River loam, in an area of Tongue River-Cabba, moist-Adel complex, 15 to 60 percent slopes, in an area of coniferous forest, 400 feet north and 100 feet west of the southeast corner of sec. 16, T. 2 N., R. 12 E.; USGS Raspberry Butte topographic quadrangle (lat. 45°54'56" N.; long. 110°13'52" W.)

Oi—0 to 2 inches; slightly decomposed twigs, leaves and needles; clear smooth boundary.

E—2 to 10 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly sticky, slightly plastic; few fine to coarse and common very fine roots; common very fine and fine pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—10 to 22 inches; pale brown (10YR 6/3) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine to coarse and common very fine roots; common very fine pores; common faint discontinuous brown (10YR 4/3) moist; clay films on faces of peds; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt2—22 to 35 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; common very fine pores; common faint discontinuous brown (10YR 4/3) moist; clay films on faces of peds; 40 to 50 percent soft shale chips; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

Cr—35 to 62 inches; soft, gray calcareous shale; strongly effervescent.

Range in Characteristics

Soil temperature: 34 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 20 to 40 inches

Note: Some pedons have a thin A horizon, and some pedons have a BC horizon.

E horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bt horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Clay loam, loam, or sandy clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 25 percent gravel or channers; 10 to 50 percent soft shale chips

Reaction: pH 5.6 to 7.3

Turner Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 20 inches = moderate (0.6 to 2.0 inches/hour); below this depth = rapid (6 to 20 inches/hour)

Landform: Fan, stream terrace, and terrace

Parent material: Loamy over sandy and gravelly alluvium

Slope range: 0 to 8 percent

Elevation range: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Turner sandy clay loam, in an area of Roy-Turner complex, 0 to 4 percent slopes, in an area of rangeland, 700 feet north and 1,800 feet east of the southwest corner of sec. 26, T. 1 N., R. 14 E.; USGS Big Timber topographic quadrangle (lat. 45°48'05" N.; long. 109°57'08" W.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine pores; 10 percent gravel; 3 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.

Bt1—5 to 11 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common fine and medium pores; common prominent discontinuous dark reddish brown (5YR 3/3) moist; clay films on faces of peds; 5 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bt2—11 to 17 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common fine and medium pores; common prominent discontinuous dark reddish brown (5YR 3/3), moist; clay films on faces of peds; 5 percent gravel; slightly alkaline (pH 7.6); clear smooth boundary.

Bk1—17 to 26 inches; light gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few fine roots; common fine pores; common fine threads and soft masses of lime; 10 percent gravel; 4 percent cobbles; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

2Bk2—26 to 51 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; few fine roots; common distinct carbonate coats on undersides of rock fragments; 35 percent gravel; 15 percent cobbles; slightly effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

2Bk3—51 to 60 inches; pale brown (10YR 6/3) extremely gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; 40 percent gravel; 20 percent cobbles; 10 percent stones; few carbonate coats on undersides of rock fragments; slightly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to the 2Bk horizon: 20 to 35 inches

Depth to the seasonal high water table (seeped phase): 0 to 12 inches

Note: Some pedons do not have a 2C horizon.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam, sandy clay loam, or loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 3 percent stones; 0 to 10 percent cobbles; 0 to 25 percent gravel

Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, loam, or sandy clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam, loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent gravel

Calcium carbonate equivalent: 8 to 15 percent

Reaction: pH 7.4 to 8.4

2Bk horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loamy sand, sand, or coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 80 percent—5 to 30 percent stones and cobbles; 30 to 60 percent gravel

Calcium carbonate equivalent: 2 to 12 percent

Reaction: pH 7.4 to 8.4

2C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sand or coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 80 percent—5 to 20 percent stones and cobbles; 30 to 60 percent gravel

Calcium carbonate equivalent: 2 to 12 percent

Reaction: pH 7.4 to 8.4

Twilight Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Escarpment, hill, and swale on plain

Parent material: Sandy residuum weathered from calcareous sandstone

Slope range: 2 to 25 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Haplocalcidic Haplustepts

Typical Pedon

Twilight fine sandy loam, in an area of Chinook-Twilight fine sandy loams, 8 to 25 percent slopes, in an area of rangeland, 700 feet north and 750 feet east of the southwest corner of sec. 4, T. 5 N., R. 15 E.; USGS Gougley Creek topographic quadrangle (lat. 46°12'26" N.; long. 109°51'32" W.)

A—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw1—6 to 13 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak coarse subangular blocky; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine pores; neutral (pH 7.0); clear smooth boundary.

Bw2—13 to 20 inches; yellowish brown (10YR 5/4) fine sandy loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine pores; neutral (pH 7.2); clear smooth boundary.

Bk—20 to 26 inches; pale brown (10YR 6/3) loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky

structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots; few very fine and fine pores; few fine threads and soft masses of lime; 10 percent gravel; strongly effervescent; slightly alkaline (pH 7.8); abrupt smooth boundary.

Cr—26 inches; light yellowish brown (2.5Y 6/3) semiconsolidated sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 10 to 20 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.6 to 7.8

Bw horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 5 percent gravel

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam, loamy sand, or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 10 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Vebar Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Swale on plain

Parent material: Coarse-loamy alluvium over residuum weathered from calcareous sandstone

Slope range: 2 to 8 percent

Elevation range: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Mean annual air temperature: 39 to 42 degrees F

Frost-free period: 70 to 90 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Vebar fine sandy loam, in an area of Vebar-Castner complex, 2 to 8 percent slopes, in an area of rangeland, 1,600 feet north and 600 feet east of the southwest corner of sec. 23, T. 5 N., R. 14 E.; USGS Melville NW topographic quadrangle (lat. 46°10'01" N.; long. 109°56'37" W.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, nonsticky, nonplastic; few medium and coarse and many very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); clear wavy boundary.

Bw1—5 to 12 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to moderate very fine and fine granular; soft, very friable, nonsticky, nonplastic; common fine and medium and many very fine roots; many very fine and fine pores; neutral (pH 7.2); clear wavy boundary.

Bw2—12 to 22 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); gradual wavy boundary.

Bk1—22 to 28 inches; light brownish gray (10YR 6/2) fine sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common very fine roots; many very fine and fine pores; few fine and medium irregular soft masses of lime; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—28 to 38 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam, light olive brown (2.5Y 5/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine pores; common fine and medium irregular soft masses of lime; 20 percent gravel; violently effervescent; moderately alkaline (pH 8.4); clear wavy boundary.

Cr—38 to 42 inches; light brownish gray (2.5Y 6/2) sandstone, dark grayish brown (2.5Y 4/2) moist; violently effervescent.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Thickness of the mollic epipedon: 7 to 16 inches

Depth to the Bk horizon: 11 to 36 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam, loam, or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.1 to 7.8

Bw horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Reaction: pH 6.1 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 20 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 6.6 to 8.4

Vershal Series

Depth class: Very shallow (0 to 10 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Escarpment, hill, and knoll on plain

Parent material: Residuum weathered from sandstone

Slope range: 2 to 60 percent

Elevation range: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 85 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Vershal very channery loam, 20 percent slopes, in an area of rangeland, 1,300 feet south and 1,900 feet west of the northeast corner of sec. 15, T. 5 N., R. 8 E.; Meagher County, Montana.

A1—0 to 4 inches; brown (10YR 5/3) very channery loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; 5 percent cobbles; 40 percent channers; neutral (pH 6.8); clear smooth boundary.

A2—4 to 8 inches; brown (7.5YR 5/2) extremely channery loam, dark brown (7.5YR 3/2) moist; moderate very fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine roots; 15 percent cobbles; 55 percent channers; neutral (pH 7.0). (The combined thickness of the A horizons is 5 to 10 inches.)

R—8 inches; hard sandstone bedrock with a few cracks; few fine roots in some cracks.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 inches and bedrock

Thickness of the mollic epipedon: 4 to 9 inches

Depth to bedrock: 4 to 10 inches

Note: Some pedons have a Bw horizon.

A horizons

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 60 percent—0 to 15 percent flagstones; 35 to 45 percent channers

Reaction: pH 5.6 to 7.3

Verson Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: In the upper 0 to 22 inches = slow (0.06 to 0.20 inch/hour); below this depth = moderately rapid (2 to 6 inches/hour)

Landform: Fan, terrace, and fan on escarpment

Parent material: Clayey over gravelly alluvium

Slope range: 0 to 8 percent

Elevation range: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 95 to 125 days

Taxonomic Class: Clayey over loamy-skeletal, smectitic over mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Verson loam, in an area of Verson loam, 0 to 4 percent slopes, in an area of rangeland, 1,500 feet south and 500 feet east of the northwest corner of sec. 27, T. 3 N., R. 18 E.; USGS Russell Gulch topographic quadrangle (lat. 45°59'07" N.; long. 109°28'58" W.)

A—0 to 5 inches; dark grayish brown (10YR 5/2) loam, dark brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; few fine and common very fine roots; common very fine and fine pores; 5 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

Bt1—5 to 9 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; moderately hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine and fine pores; common distinct dark brown (10YR 3/3) moist; clay films on faces of peds; 5 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

Bt2—9 to 13 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky; moderately hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine and fine pores; common distinct dark yellowish brown (10YR 3/4) moist; clay films on faces of peds; 10 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.

Bt3—13 to 21 inches; brown (10YR 5/3) gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; moderately hard, firm, slightly sticky, slightly plastic; few very fine roots; few very fine and fine pores; common faint dark yellowish brown (10YR 4/4) moist; clay films lining pores; 10 percent gravel; 5 percent channers; slightly alkaline (pH 7.6); gradual smooth boundary.

2Bk—21 to 60 inches; light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure; soft, friable, slightly sticky, slightly plastic; few fine roots; discontinuous carbonate coats on undersides of rock fragments; few fine soft masses of lime; 40 percent gravel; 10 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 12 inches

Depth to the Bk horizon (where present): 11 to 21 inches

Depth to the 2Bk horizon: 15 to 36 inches

Note: Some pedons have a Bk horizon.

A horizon

Hue: 10YR or 2.5Y

Value: 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, silty clay, clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 15 percent gravel or channers

Reaction: pH 6.1 to 7.8

2Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 5 to 25 percent

Content of rock fragments: 50 to 85 percent—5 to 10 percent cobbles; 40 to 75 percent gravel

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Vision Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill

Parent material: Gravelly colluvium weathered from tuff breccia

Slope range: 35 to 60 percent

Elevation range: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 85 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

Typical Pedon

Vision gravelly loam, in an area of Vision-Sweetweed-Whitlash complex, 25 to 60 percent slopes, in an area of coniferous forest, 2,400 feet south and 250 feet east of the northwest corner of sec. 19, T. 2 S., R. 16 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°38'46" N.; long. 109°48'28" W.)

Oi—0 to 1 inch; slightly decomposed needles, twigs, and leaves.

A1—1 to 4 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 13 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); abrupt smooth boundary.

A2—4 to 8 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common medium and many fine roots; many very fine and fine pores; 20 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

Bt1—8 to 13 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; common faint discontinuous dark brown (10YR 3/3) moist; clay films on faces

of peds and lining pores; 25 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bt2—13 to 21 inches; brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; 35 percent gravel; 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bt3—21 to 37 inches; very pale brown (10YR 7/3) very gravelly clay loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few coarse and common fine and medium roots; many very fine and fine pores; common distinct discontinuous dark yellowish brown and yellowish brown (10YR 4/4 and 5/4) moist; clay films on faces of peds and lining pores; 40 percent gravel; 10 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

BC—37 to 61 inches; very pale brown (10YR 7/3) extremely gravelly loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few coarse and common medium roots; many very fine and fine pores; common distinct dark yellowish brown (10YR 4/4) moist, stains on coarse fragments; 45 percent gravel; 15 percent cobbles; 5 percent stones; neutral (pH 6.6).

Range in Characteristics

Soil temperature: 40 to 45 degrees F

Moisture control section: Between 4 and 12 inches

A horizons

Hue: 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—5 to 15 percent stones and cobbles; 10 to 25 percent gravel or channers

Reaction: pH 5.6 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, sandy clay loam, or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 15 to 35 percent—5 to 15 percent stones and cobbles; 10 to 25 percent gravel or channers

Reaction: pH 5.6 to 7.3

Bt2 and Bt3 horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam, loam, or sandy clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—5 to 30 percent stones and cobbles; 30 to 50 percent gravel or channers

Reaction: pH 5.6 to 7.3

BC horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 80 percent—15 to 30 percent stones and cobbles; 20 to 50 percent gravel or channers

Reaction: pH 5.6 to 7.3

Warwood Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Mountain

Parent material: Loamy alluvium or colluvium

Slope range: 4 to 45 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Eutric Glossocryalfs

Typical Pedon

Warwood loam, in an area of Warwood-Timberlin-Cowood complex, 8 to 35 percent slopes, in an area of coniferous forest, 600 feet south and 2,300 feet west of the northeast corner of sec. 12, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°35'42" N.; long. 110°03'44" W.)

Oi—0 to 2 inches; forest litter of partially decomposed needles, twigs, and leaves.

- A—2 to 5 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak very fine and fine granular; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; moderately acid (pH 5.6); clear smooth boundary.
- E—5 to 13 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak thin platy structure parting to weak fine and medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; moderately acid (pH 6.0); clear smooth boundary.
- E/Bt—13 to 20 inches; E part (75 percent) light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist tongues; Bt part (25 percent) brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak medium and moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine pores; faint patchy dark yellowish brown (10YR 4/4) moist; clay films on faces of peds in Bt part; 5 percent gravel; slightly acid (pH 6.2); gradual irregular boundary.
- Bt1—20 to 30 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; common very fine and fine pores; common distinct discontinuous dark yellowish brown (10YR 4/4) moist; clay films on faces of peds and lining pores; 10 percent gravel; slightly acid (pH 6.2); clear smooth boundary.
- Bt2—30 to 43 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, slightly plastic; few coarse and common medium roots; common very fine and fine pores; common distinct discontinuous yellowish brown (10YR 5/4) moist; clay films on faces of peds and lining pores; 25 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.
- BC—43 to 62 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few medium and coarse roots; many very fine and fine pores; 40 percent gravel; slightly acid (pH 6.2).

Range in Characteristics

Soil temperature: 40 to 44 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bt horizon: 4 to 24 inches

Note: Some pedons have an A horizon. Some pedons do not have a BC horizon.

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam

Clay content: 20 to 27 percent

Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent gravel

Reaction: pH 5.6 to 6.5

E horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 15 percent gravel

Reaction: pH 5.6 to 6.5

E/Bt horizon

Hue: 10YR or 2.5Y

Value: E part—5 or 6, Bt part—4 or 5 dry; E part—4 or 5, Bt part—3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, sandy loam, or sandy clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 15 percent gravel

Reaction: pH 5.6 to 6.5

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent gravel

Reaction: pH 6.1 to 7.3

BC horizon:

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam or loam

Clay content: 10 to 27 percent

Content of rock fragments: 15 to 60 percent—0 to 10 percent cobbles; 15 to 50 percent gravel

Reaction: pH 6.1 to 7.3

Wayden Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Escarpment, fan, hill, terrace, and knoll on plain

Parent material: Clayey residuum weathered from shale and siltstone

Slope range: 2 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Clayey, smectitic, calcareous, frigid, shallow Typic Ustorthents

Typical Pedon

Wayden clay loam, in an area of Wayden-Castner complex, 15 to 60 percent slopes, in an area of rangeland, 1,200 feet north and 2,400 feet west of the southeast corner of sec. 17, T. 4 S., R. 19 E.; Stillwater County, Montana.

A—0 to 6 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium granular structure; hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline (pH 7.6); gradual wavy boundary.

Bk—6 to 14 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; about 2 percent clayey and sandy soft shale

fragments; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Cr1—14 to 20 inches; weathered shale with pockets of gypsum crystals between shale layers; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

Cr2—20 to 60 inches; calcareous shale.

Range in Characteristics

Soil temperature: 40 to 44 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 4 to 10 inches

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 2.5Y or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay or clay loam

Clay content: 27 to 50 percent

Content of rock fragments: 0 to 5 percent gravel or channers

Calcium carbonate equivalent: 0 to 5 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 2.5Y or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 1 to 4

Texture (less than 2 mm): Clay, clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent gravel or channers; 0 to 50 percent soft shale chips

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 0 to 8 mmhos/cm

Reaction: pH 7.4 to 8.4

Weedzunit Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Hill

Parent material: Residuum from tuff breccia

Slope range: 8 to 35 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Weedzunit fine sandy loam, in an area of Weedzunit-Ashbon complex, 4 to 15 percent slopes, in an area of rangeland, 300 feet south and 1,100 feet west of the northeast corner of sec. 8, T. 2 S., R. 15 E.; USGS Ross Canyon topographic quadrangle (lat. 45°40'49" N.; long. 109°53'44" W.)

A1—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly acid (pH 6.2); clear smooth boundary.

A2—7 to 11 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; slightly acid (pH 6.2); clear smooth boundary.

Bw1—11 to 17 inches; grayish brown (10YR 5/2) fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bw2—17 to 24 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; many very fine and fine pores; 10 percent gravel; slightly acid (pH 6.4); gradual smooth boundary.

BC—24 to 29 inches; light brownish gray (10YR 6/2) gravelly fine sandy loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, friable, nonsticky, nonplastic; few fine and medium roots; many very fine and fine pores; 25 percent gravel; neutral (pH 6.6); abrupt smooth boundary.

R—29 to 33 inches; gray volcanic mudflow breccia.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to bedrock: 20 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bw1 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam or loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

Bw2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Fine sandy loam or loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 15 percent gravel

Reaction: pH 5.6 to 7.3

BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Fine sandy loam, sandy loam, or loam

Clay content: 10 to 18 percent

Content of rock fragments: 15 to 60 percent gravel

Reaction: pH 5.6 to 7.3

Whitlash Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Hill, structural bench, and knoll on plain

Parent material: Residuum weathered from gabbro or tuff breccia

Slope range: 4 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Whitlash gravelly loam, in an area of Vision-Sweetweed-Whitlash complex, 25 to 60 percent slopes, in an area of coniferous forest, 1,200 feet south and 700 feet west of the northeast corner of sec. 9, T. 2 S., R. 15 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°40'41" N.; long. 109°52'23" W.)

Oi—0 to 1 inch; undecomposed needles, plant material, bark, twigs, and cones.

A—1 to 8 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; soft, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; common very fine and fine pores; 20 percent gravel; 10 percent cobbles; neutral (pH 7.0); clear smooth boundary.

Bw—8 to 16 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky and weak fine granular; soft, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; 40 percent gravel; 15 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.

R—16 inches; hard, fine grained igneous rock.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 10 to 27 percent

Content of rock fragments: 15 to 60 percent—0 to 30 percent stones, flagstones, or cobbles; 15 to 35 percent gravel or channers

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam, sandy clay loam, or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 80 percent—5 to 50 percent stones, flagstones, or cobbles; 15 to 60 percent gravel or channers

Reaction: pH 6.1 to 7.3

Whitore Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Moraine and mountain

Parent material: Gravelly colluvium weathered from limestone and sandstone or gravelly till

Slope range: 35 to 60 percent

Elevation range: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, carbonatic Typic Eutrocrypts

Typical Pedon

Whitore loam, in an area of Tibson-Whitore-Rock outcrop complex, 35 to 70 percent slopes, in an area of coniferous forest, 320 feet north and 1,800 feet west of the southeast corner of sec. 24, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°33'32" N.; long. 110°03'17" W.)

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; many very fine and fine pores; 10 percent channers; strongly effervescent; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bw—4 to 12 inches; brown (7.5YR 5/3) channery loam, brown (7.5YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine to coarse roots; many very fine and fine pores; 16 percent channers; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

Bk1—12 to 28 inches; light brown (7.5YR 6/3) very channery loam, brown (7.5YR 5/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic;

common fine to coarse roots; many very fine and fine pores; common continuous carbonate coats on rock fragments; 40 percent channers; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk2—28 to 42 inches; pinkish gray (7.5YR 7/2) very channery loam, pinkish gray (7.5YR 6/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine to coarse roots; many very fine and fine pores; common continuous carbonate coats on rock fragments; 40 percent channers; 5 percent cobbles; violently effervescent; strongly alkaline (pH 8.6); gradual smooth boundary.

Bk3—42 to 60 inches; pinkish gray (7.5YR 7/2) very channery loam, pinkish gray (7.5YR 6/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium roots; common continuous carbonate coats on rock fragments; 45 percent channers; 10 percent cobbles; violently effervescent; strongly alkaline (pH 8.6).

Range in Characteristics

Soil temperature: 36 to 42 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 5 to 15 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 60 percent—0 to 25 percent stones and cobbles; 5 to 35 percent gravel or channers

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 15 to 60 percent—0 to 25 percent stones and cobbles; 5 to 40 percent gravel or channers

Calcium carbonate equivalent: 35 to 50 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 85 percent—0 to 40 percent stones and cobbles; 25 to

65 percent gravel or channers

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.9 to 9.0

Winifred Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow (0.06 to 0.20 inch/hour)

Landform: Escarpment, hill, and swale on plain

Parent material: Clayey residuum weathered from sandstone and shale

Slope range: 2 to 45 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Fine, smectitic, frigid Entic Haplustolls

Typical Pedon

Winifred clay loam, in an area of Cabba-Winifred clay loams, 2 to 8 percent slopes, in an area of rangeland, 500 feet north and 1,050 feet east of the southwest corner of sec. 16, T. 4 N., R. 14 E.; USGS Melville topographic quadrangle (lat. 46°05'28" N.; long. 109°59'37" W.)

A—0 to 4 inches; dark grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine and medium granular structure; moderately hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; slightly alkaline (pH 7.6); abrupt smooth boundary.

Bw—4 to 11 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; strong fine and medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; many very fine and fine roots; many very fine and fine pores; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk1—11 to 22 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse angular blocky structure; very hard, firm, very sticky, very plastic; common very fine and fine roots; common very fine pores; common fine threads of lime; strongly

effervescent; moderately alkaline (pH 8.4); clear smooth boundary.

Bk2—22 to 30 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; moderate coarse angular blocky structure; very hard, firm, very sticky, very plastic; few fine and medium roots; few very fine and fine pores; common fine and medium soft masses threads of lime; violently effervescent; strongly alkaline (pH 8.6); abrupt smooth boundary.

BC—30 to 35 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium roots; 10 percent gravel; violently effervescent; strongly alkaline (pH 8.8); clear smooth boundary.

Cr—35 to 60 inches; weathered bedrock; soft, calcareous siltstone; violently effervescent.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 15 inches

Depth to the Bk horizon: 11 to 22 inches

Depth to the Cr horizon: 20 to 40 inches

Note: Some pedons do not have a BC horizon.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent gravel

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 1 to 5 percent

Electrical conductivity: 1 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 5

Gypsum content: 1 to 5 percent

Reaction: pH 7.4 to 9.0

BC horizon:

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 40 percent

Content of rock fragments: 0 to 35 percent gravel or channers

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 5

Gypsum content: 1 to 5 percent

Reaction: pH 7.4 to 9.0

Winkler Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Somewhat excessively drained

Permeability: Moderately rapid (2 to 6 inches/hour)

Landform: Hill

Parent material: Gravelly colluvium

Slope range: 15 to 60 percent

Elevation range: 3,900 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

Typical Pedon

Winkler very gravelly sandy loam, in an area of Ashbon-Winkler-Rock outcrop complex, 35 to 60 percent slopes, in an area of coniferous forest, 150 feet north and 2,500 feet east of the southwest corner of sec. 18, T. 2 S., R. 16 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°39'13" N.; long. 109°47'54" W.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine pores; 40 percent gravel; neutral (pH 7.2); abrupt smooth boundary.

E1—4 to 12 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine pores; 45 percent gravel; neutral (pH 7.2); clear smooth boundary.

E2—12 to 27 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine roots; many very fine and fine pores; 45 percent gravel; 5 percent cobbles; neutral (pH 7.2); gradual smooth boundary.

E&Bt—27 to 45 inches; E part (80 percent) light brownish gray (10YR 6/2) extremely gravelly sandy loam, dark grayish brown (10YR 4/2) moist; B part (20 percent) pale brown (10YR 6/3) sandy loam lamellae 1/4- to 1-inch thick, brown (10YR 4/3) moist; weak medium and coarse prismatic structure; soft, very friable, nonsticky, nonplastic; 50 percent gravel; 10 percent cobbles; neutral (pH 7.0); gradual smooth boundary.

C—45 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine and medium roots; many very fine and fine pores; 50 percent gravel; 10 percent cobbles; neutral (pH 6.8).

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 8 and 24 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam

Clay content: 7 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent cobbles; 15 to 55 percent gravel

Reaction: pH 5.6 to 6.1

E1 horizon

Hue: 7.5YR or 10YR

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 7 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent cobbles; 15 to 55 percent gravel

Reaction: pH 5.6 to 6.1

E2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture (less than 2 mm): Sandy loam or loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 70 percent—0 to 10 percent cobbles; 35 to 60 percent gravel

Reaction: pH 5.6 to 7.3

E&Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: E part 6 to 8, Bt part 4 to 6 dry; E part 4 to 7, Bt part 4 or 5 moist

Chroma: E part 2 to 4; Bt part 3 or 4

Texture (less than 2 mm): Sandy loam, fine sandy loam, or loam

Clay content: 5 to 15 percent; lamellae have less than 5 percent clay increase

Content of rock fragments: 60 to 80 percent—10 to 25 percent cobbles; 40 to 55 percent gravel

Reaction: pH 5.6 to 7.3

C horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture (less than 2 mm): Sandy loam or fine sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 60 to 85 percent—10 to 25 percent cobbles; 50 to 60 percent gravel

Reaction: pH 5.6 to 7.3

Winspect Series

Depth class: Very deep (greater than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Fan, hill, landslide, moraine, mountain, and fan on escarpment

Parent material: Gravelly colluvium or alluvium weathered from limestone; gravelly glaciofluvial deposits; gravelly till; or gravelly colluvium weathered from limestone and sandstone

Slope range: 4 to 70 percent

Elevation range: 4,200 to 6,200 feet

Mean annual precipitation: 15 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 70 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Calciustolls

Typical Pedon

Winspect cobbly loam, in an area of Winspect cobbly loam, 4 to 15 percent slopes, in an area of rangeland, 1,400 feet north and 2,600 feet west of the southeast corner of sec. 13, T. 3 S., R. 12 E.; USGS McLeod Basin topographic quadrangle (lat. 45°34'16" N.; long. 110°11'40" W.)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) cobbly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; 15 percent gravel; 8 percent cobbles; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

Ak—6 to 14 inches; dark gray (10YR 4/1) very cobbly loam, black (10YR 2/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many fine and medium roots; many very fine and fine pores; few fine carbonate threads; 25 percent gravel; 10 percent cobbles; 5 percent stones; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk1—14 to 27 inches; light brownish gray (10YR 6/2) very cobbly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine pores; common carbonate coats on undersides of rock fragments; common fine and medium threads and soft masses of lime; 25 percent gravel; 15 percent cobbles; 5 percent stones; violently effervescent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk2—27 to 60 inches; light brownish gray (10YR 6/2) very cobbly loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few fine and medium roots; many very fine and fine pores; common carbonate coats on undersides of rock fragments; many fine and medium threads and soft masses of lime; 30 percent gravel; 15 percent cobbles; 10 percent stones; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Thickness of the mollic epipedon: 7 to 14 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture (less than 2 mm): Loam

Clay content: 20 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 10 percent stones and cobbles; 10 to 15 percent gravel

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Ak horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 20 to 60 percent—5 to 30 percent stones; 5 to 15 percent cobbles; 10 to 30 percent gravel

Calcium carbonate equivalent: 10 to 40 percent

Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—5 to 30 percent stones and cobbles; 20 to 35 percent gravel

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 9.0

Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture (less than 2 mm): Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—10 to 30 percent stones and cobbles; 25 to 35 percent gravel

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 9.0

Work Series

Depth class: Deep (40 to 60 inches or more)

Drainage class: Well drained

Permeability: Moderately slow (0.2 to 0.6 inch/hour)
Landform: Fan, hill, landslide, moraine, stream terrace, terrace, fan on escarpment, and swale on plain
Parent material: Clayey alluvium or colluvium weathered from sandstone and shale
Slope range: 0 to 35 percent
Elevation range: 4,200 to 6,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 115 days

Taxonomic Class: Fine, smectitic, frigid Typic Argiustolls

Typical Pedon

Work clay loam, in an area of Work clay loam, 4 to 8 percent slopes, in an area of rangeland, 1,900 feet south and 1,800 feet west of the northeast corner of sec. 18, T. 1 S., R. 16 E.; USGS Packsaddle Butte topographic quadrangle (lat. 45°44'56" N.; long. 109°47'39" W.)

A—0 to 5 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine and fine pores; neutral (pH 7.2); abrupt smooth boundary.

Bt1—5 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; common very fine and fine roots; many very fine and fine pores; common distinct continuous dark olive brown (2.5Y 3/3) moist; clay films on faces of peds; neutral (pH 7.2); abrupt wavy boundary.

Bt2—14 to 18 inches; grayish brown (10YR 5/2) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; common very fine and fine roots; many very fine and fine pores; common faint discontinuous dark olive brown (2.5Y 3/3) moist; clay films on faces of peds; neutral (pH 7.2); abrupt wavy boundary.

Bk1—18 to 30 inches; light brownish gray (10YR 6/2), clay loam, grayish brown (10YR 5/2), crushed, moist; weak medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; few very fine and fine roots; many very fine and fine pores; few fine soft masses of lime; slightly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk2—30 to 60 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; moderately hard, firm, very sticky, very plastic; few very fine roots; common very fine pores; common coarse soft masses of lime; strongly effervescent; slightly alkaline (pH 7.8).

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 12 to 30 inches
Note: Some pedons have a Btk horizon.

A horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam or loam
Clay content: 15 to 40 percent
Content of rock fragments: 0 to 60 percent—0 to 30 percent stones and cobbles; 0 to 30 percent gravel
Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 to 4 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay loam or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent stones and cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Clay loam or loam
Clay content: 15 to 40 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent stones and cobbles; 0 to 30 percent gravel
Calcium carbonate equivalent: 3 to 15 percent
Electrical conductivity: 0 to 3 mmhos/cm
Reaction: pH 7.4 to 8.4

Worock Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour)

Landform: Mountain

Parent material: Gravelly colluvium or till

Slope range: 25 to 70 percent

Elevation range: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Mean annual air temperature: 36 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

Typical Pedon

Worock gravelly loam, in an area of Stemple-Worock complex, 35 to 70 percent slopes, very stony, in an area of coniferous forest, 600 feet north and 1,800 feet west of the southeast corner of sec. 13, T. 3 S., R. 13 E.; USGS Squaw Peak topographic quadrangle (lat. 45°34'12" N.; long. 110°03'36" W.)

O—0 to 1 inch; partially decomposed forest litter; abrupt smooth boundary.

E1—1 to 4 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) dry; weak medium platy structure parting to weak fine granular; soft, very friable, slightly sticky, slightly plastic; few medium and common fine roots; common very fine and fine, few medium pores; 15 percent gravel; 5 percent stones; slightly acid (pH 6.4); abrupt smooth boundary.

E2—4 to 10 inches; light gray (10YR 7/2) gravelly loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few medium and coarse and common fine roots; common very fine and fine pores; 15 percent gravel; 5 percent cobbles; moderately acid (pH 6.0); clear smooth boundary.

E/Bt—10 to 17 inches; E part (70 percent) light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; Bt part (30 percent) yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine to coarse roots; common very fine and fine pores; common distinct discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds and lining pores; 30 percent gravel; 10 percent cobbles; slightly acid (pH 6.2); clear smooth boundary.

Bt1—17 to 28 inches; yellowish brown (10YR 5/4) very gravelly clay loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, very sticky, very plastic; few fine to coarse roots; common

very fine and fine pores; common distinct discontinuous dark brown (10YR 3/3) moist; clay films on faces of peds and lining pores; 35 percent gravel; 5 percent cobbles; slightly acid (pH 6.2); clear smooth boundary.

Bt2—28 to 36 inches; brown (10YR 5/3) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; few fine and medium roots; few very fine and fine pores; common faint patchy brown (10YR 4/3) moist; clay films on faces of peds and lining pores; 35 percent gravel; 10 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

BC—36 to 61 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few fine roots; few very fine pores; 35 percent gravel; 10 percent cobbles; 5 percent stones; slightly acid (pH 6.4).

Range in Characteristics

Soil temperature: 37 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bt horizon: 6 to 20 inches

E horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 2 to 4 or 6

Texture (less than 2 mm): Loam

Clay content: 18 to 27 percent

Content of rock fragments: 10 to 50 percent—5 to 35 percent stones and cobbles; 5 to 15 percent gravel

Reaction: pH 5.1 to 6.5

E/Bt horizon

Hue: 10YR or 2.5Y

Value: E part—6 or 7, Bt part—5 or 6 dry; E part—3 to 5, Bt part—4 or 5 moist

Chroma: E part—2 to 4 or 6; Bt part—3, 4, or 6

Texture (less than 2 mm): E part—loam or sandy loam; Bt part—clay loam or loam

Clay content: 18 to 30 percent

Content of rock fragments: 20 to 60 percent—10 to 35 percent stones and cobbles; 10 to 35 percent gravel

Reaction: pH 5.1 to 6.5

Bt horizons

Hue: 7.5YR or 10YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture (less than 2 mm): Clay loam, loam, or sandy clay loam
Clay content: 25 to 35 percent
Content of rock fragments: 35 to 65 percent—5 to 25 percent cobbles; 25 to 35 percent gravel
Reaction: pH 5.6 to 6.5

BC horizon

Hue: 7.5YR or 10YR
Value: 6 or 7 dry; 4 to 6 moist
Chroma: 3, 4, or 6
Texture (less than 2 mm): Loam, clay loam, or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 35 to 60 percent—10 to 25 percent stones and cobbles; 25 to 45 percent gravel
Reaction: pH 5.6 to 6.5

Yamacall Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Escarpment, fan, hill, stream terrace, and swale on plain
Parent material: Loamy alluvium
Slope range: 1 to 15 percent
Elevation range: 3,750 to 5,600 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Haplustepts

Typical Pedon

Yamacall loam, in an area of Yamacall loam, 1 to 4 percent slopes, in an area of cropland, 2,600 feet south and 1,500 feet east of the northwest corner of sec. 5, T. 4 N., R. 16 E.; USGS Gougley Creek topographic quadrangle (lat. 46°07'31" N.; long. 109°45'51" W.)

Ap—0 to 6 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many fine pores; slightly alkaline (pH 7.6); abrupt smooth boundary.
 Bw1—6 to 10 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine

pores; moderately alkaline (pH 8.0); clear smooth boundary.

Bw2—10 to 18 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine and fine pores; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

Bk1—18 to 24 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; common very fine and fine pores; many fine threads and soft masses of lime; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk2—24 to 36 inches; light olive brown (2.5Y 5/4) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; common very fine and fine pores; common fine soft masses of lime; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bk3—36 to 60 inches; light olive brown (2.5Y 5/4) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; common fine soft masses of lime; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 10 to 20 inches
Note: Some pedons have a BC horizon with a clay content of 5 to 15 percent.

A horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Reaction: pH 6.6 to 8.4

Bw horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, clay loam, or silt loam

Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
Reaction: pH 6.6 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture (less than 2 mm): Loam, clay loam, or silt loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 5
Gypsum content: 0 to 1 percent
Reaction: pH 7.9 to 9.0

Yawdim Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.20 inch/hour)
Landform: Escarpment, hill, and knoll on plain
Parent material: Clayey residuum weathered from calcareous shale
Slope range: 2 to 60 percent
Elevation range: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 125 days

Taxonomic Class: Clayey, smectitic, calcareous, frigid, shallow Aridic Ustorthents

Typical Pedon

Yawdim clay, in an area of Tanna-Yawdim complex, 2 to 8 percent slopes, in an area of rangeland, 1,600 feet north and 500 feet west of the southeast corner of sec. 30, T. 3 N., R. 15 E.; USGS Otter Creek School topographic quadrangle (lat. 45°58'41" N.; long. 109°53'53" W.)

A—0 to 2 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate thick platy structure parting to weak fine granular; moderately hard, friable, very sticky, very plastic; common very fine and fine roots; common very fine pores; 10 percent channers; slightly effervescent; slightly alkaline (pH 7.8); abrupt wavy boundary.

Bw—2 to 6 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate

medium subangular blocky structure; moderately hard, friable, very sticky, very plastic; many very fine and fine roots; common very fine pores; 10 percent channers; slightly effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.

Bk—6 to 14 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, friable, very sticky, very plastic; common very fine roots; few very fine tubular pores; common fine soft masses of lime; 10 percent channers; strongly effervescent; strongly alkaline (pH 8.6); abrupt wavy boundary.
 Cr—14 to 60 inches; fractured calcareous shale; breaks into small angular blocks; violently effervescent.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to the Bk horizon: 4 to 9 inches
Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2
Texture (less than 2 mm): Clay or clay loam
Clay content: 27 to 50 percent
Content of rock fragments: 0 to 15 percent gravel or channers
Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture (less than 2 mm): Clay, clay loam, or silty clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent gravel or channers
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8 dry; 4 to 6 moist
Chroma: 1 to 4
Texture (less than 2 mm): Clay, clay loam, or silty clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 15 percent gravel or channers; 0 to 50 percent soft shale chips
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.6

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently,

they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all of the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hinterland clay loam, 0 to 8 percent slopes, is a phase of the Hinterland series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes complexes. They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous

areas are somewhat similar in all areas. Cabbart-Tanna complex, 2 to 8 percent slopes, is an example.

This survey includes miscellaneous areas. They have little or no soil material and support little or no vegetation. Rock outcrop is an example.

The "Acreage and Proportionate Extent of the Soils" table gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the "Glossary."

100B—Nesda-Meadowcreek-Clunton loams, 0 to 4 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Major Component Description

Nesda and similar soils

Composition: 40 percent

Geomorphic description: Flood plain

Slope: 0 to 4 percent

Elevation: 3,750 to 4,300 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Sandy and gravelly alluvium

Native plant cover type: Forestland

Flooding: Occasional

Available water capacity: Mainly 3.8 inches

Meadowcreek and similar soils

Composition: 30 percent

Geomorphic description: Flood plain

Slope: 0 to 2 percent

Elevation: 3,750 to 4,300 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Surface layer texture: Loam

Drainage class: Somewhat poorly drained

Parent material: Fine-loamy over sandy and gravelly alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Available water capacity: Mainly 6.3 inches

Clunton and similar soils

Composition: 25 percent

Geomorphic description: Depression and flood plain

Slope: 0 to 4 percent

Elevation: 3,750 to 4,300 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Surface layer texture: Muck

Drainage class: Very poorly drained

Parent material: Fine-loamy alluvium over sandy and gravelly alluvium

Native plant cover type: Rangeland

Flooding: Frequent

Water table: Present

Ponding duration: Brief

Available water capacity: Mainly 10.2 inches

Additional Components

Mellwaine and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

102B—Ledger family, clay loam, 1 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Ledger and similar soils

Composition: 85 percent

Geomorphic description: Flood plain

Slope: 1 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Drainage class: Somewhat poorly drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 6.9 inches

Additional Components

Klayent and similar soils: 5 percent
Kobase and similar soils: 5 percent
Thibadeau and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

103A—Havre loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Havre and similar soils

Composition: 85 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.6 inches

Additional Components

Ledger and similar soils: 7 percent
Klayent and similar soils: 4 percent
Yamacall and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

104A—Meadowcreek loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 6,000 feet
Mean annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days

Major Component Description

Meadowcreek and similar soils

Composition: 85 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 6,000 feet
Effective annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days
Surface layer texture: Loam
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 6.3 inches

Additional Components

Fairway and similar soils: 5 percent
Nesda and similar soils: 5 percent
Swampcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

106B—Thibadeau loam, channeled, saline, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Thibadeau and similar soils

Composition: 85 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Salt affected: Saline within 30 inches
Available water capacity: Mainly 6.5 inches

Additional Components

Lallie and similar soils: 5 percent
 Ledger and similar soils: 5 percent
 Yamacall and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

107A—Nesda-McIlwaine loams, 0 to 2 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Nesda and similar soils

Composition: 50 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Forestland
Flooding: Occasional
Available water capacity: Mainly 3.8 inches

McIlwaine and similar soils

Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Somewhat poorly drained
Parent material: Coarse-loamy over sandy and gravelly alluvium
Native plant cover type: Forestland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 5.4 inches

Additional Components

Albicalis and similar soils: 5 percent
 Meadowcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

109A—Meadowcreek-Nesda loams, 0 to 2 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Meadowcreek and similar soils

Composition: 50 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Somewhat poorly drained
Parent material: Fine-loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 6.3 inches

Nesda and similar soils

Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Forestland
Flooding: Occasional
Available water capacity: Mainly 3.8 inches

Additional Components

Albicalis and similar soils: 3 percent
 Fairway and similar soils: 3 percent
 Korchea and similar soils: 2 percent
 McIlwaine and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

110D—Cabbart loam, 2 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 85 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Delpoint and similar soils: 5 percent

Megonot and similar soils: 4 percent

Rentsac and similar soils: 2 percent

Rock outcrop: 2 percent

Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

110E—Cabbart loam, 15 to 35 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 85 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Interfluvial summit on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Delpoint and similar soils: 5 percent

Rock outcrop: 4 percent

Rentsac and similar soils: 3 percent

Yawdim and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

112C—Cabbart-Delpoint, calcareous, loams, 2 to 8 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Yamacall and similar soils: 4 percent
 Boxwell and similar soils: 2 percent
 Rentsac and similar soils: 2 percent
 Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

112D—Cabbart-Delpoint, calcareous, loams, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Yamacall and similar soils: 4 percent
 Rentsac and similar soils: 2 percent
 Rock outcrop: 2 percent
 Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

112E—Cabbart-Delpoint, calcareous loams, 15 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Rock outcrop: 4 percent

Yamacall and similar soils: 4 percent

Rentsac and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

115D—Yawdim-Rentsac-Cabbart complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yawdim and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland
Available water capacity: Mainly 2.4 inches

Rentsac and similar soils

Composition: 30 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Cabbart and similar soils

Composition: 20 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Reedpoint and similar soils: 3 percent

Delpoint and similar soils: 2 percent

Hinterland and similar soils: 2 percent

Tanna and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

116F—Cabbart-Rock outcrop complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 70 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope backslope on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Delpoint and similar soils: 4 percent

Rentsac and similar soils: 3 percent

Yamacall and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

117C—Cabbart-Tanna complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Tanna and similar soils

Composition: 40 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.2 inches

Additional Components

Hinterland and similar soils: 4 percent

Ethridge and similar soils: 2 percent

Yawdim and similar soils: 2 percent

Delpoint and similar soils: 1 percent

Reedpoint and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

118C—Hinterland clay loam, 0 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Hinterland and similar soils

Composition: 85 percent

Geomorphic description: Knoll and plain

Slope: 0 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Additional Components

Tanna and similar soils: 7 percent
 Cabbart and similar soils: 5 percent
 Boxwell and similar soils: 2 percent
 Reedpoint and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

127C—Marmarth loam, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Marmarth and similar soils

Composition: 85 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.6 inches

Additional Components

Hinterland and similar soils: 4 percent
 Tanna and similar soils: 4 percent
 Delpoint and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Reedpoint and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

129C—Tanna-Cabbart complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Cabbart and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Additional Components

Boxwell and similar soils: 4 percent
 Delpoint and similar soils: 2 percent
 Kremlin and similar soils: 2 percent
 Marmarth and similar soils: 1 percent
 Yawdim and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

129D—Tanna-Cabbart complex, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Cabbart and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Additional Components

Boxwell and similar soils: 3 percent
 Delpoint and similar soils: 2 percent
 Marmarth and similar soils: 2 percent
 Yawdim and similar soils: 2 percent
 Ethridge and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

130C—Tanna-Hinterland clay loams, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Hinterland and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Additional Components

Marmarth and similar soils: 3 percent
 Reedpoint and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Delpoint and similar soils: 1 percent
 Yawdim and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**130D—Tanna-Hinterland clay loams,
8 to 15 percent slopes****Setting**

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description**Tanna and similar soils**

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Hinterland and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Additional Components

Cabbart and similar soils: 3 percent
 Marmarth and similar soils: 3 percent
 Reedpoint and similar soils: 2 percent
 Delpoint and similar soils: 1 percent
 Yawdim and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**131D—Reedpoint very channery loam,
2 to 15 percent slopes****Setting**

Field investigation intensity: Order 2
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description**Reedpoint and similar soils**

Composition: 85 percent
Geomorphic description: Plain and structural bench
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Hinterland and similar soils: 6 percent
 Rock outcrop: 4 percent
 Tanna and similar soils: 3 percent
 Cabbart and similar soils: 1 percent
 Rentsac and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**131F—Reedpoint very channery loam,
15 to 60 percent slopes****Setting**

Field investigation intensity: Order 2
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Reedpoint and similar soils

Composition: 85 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.4 inches

Additional Components

Rentsac and similar soils: 6 percent

Rock outcrop: 5 percent

Cabbart and similar soils: 2 percent

Tanna and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

134B—Yamacall loam, 1 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yamacall and similar soils

Composition: 85 percent

Geomorphic description: Tread on stream terrace

Slope: 1 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Lonna and similar soils: 4 percent

Delpoint and similar soils: 3 percent

Havre and similar soils: 3 percent

Kobase and similar soils: 3 percent

Kremlin and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

134C—Yamacall loam, 4 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yamacall and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 4 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Yamacall and similar soils: 9 percent

Kremlin and similar soils: 6 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

134D—Yamacall loam, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yamacall and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.6 inches

Additional Components

Yamacall and similar soils: 9 percent
 Kremlin and similar soils: 6 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

135A—Fairway loam, 0 to 2 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,750 to 6,000 feet
Mean annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days

Major Component Description

Fairway and similar soils

Composition: 85 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 6,000 feet
Effective annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days
Surface layer texture: Loam
Drainage class: Somewhat poorly drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 9.1 inches

Additional Components

Meadowcreek and similar soils: 5 percent
 Soapcreek and similar soils: 4 percent
 Swampcreek and similar soils: 4 percent

Macar and similar soils: 0 to 2 percent
 Yamacall and similar soils: 0 to 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

138D—Cabbart-Megonot-Kobase clay loams, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Megonot and similar soils

Composition: 30 percent
Geomorphic description: Plain and swale
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale
Native plant cover type: Rangeland
Available water capacity: Mainly 3.9 inches

Kobase and similar soils

Composition: 20 percent
Geomorphic description: Plain and swale
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 9.4 inches

Additional Components

Delpoint and similar soils: 5 percent
 Yawdim and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

139C—Cabbart-Delpoint loams, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Boxwell and similar soils: 4 percent
 Reedpoint and similar soils: 2 percent
 Rentsac and similar soils: 2 percent
 Yamacall and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

139D—Cabbart-Delpoint loams, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Boxwell and similar soils: 4 percent
 Reedpoint and similar soils: 2 percent
 Rentsac and similar soils: 2 percent
 Yamacall and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

139E—Cabbart-Delpoint loams, 15 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Rentsac and similar soils: 3 percent
 Yamacall and similar soils: 3 percent
 Reedpoint and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

140F—Yawdim-Rentsac complex, 15 to 60 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Yawdim and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment
- Side slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Rentsac and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Additional Components

Rock outcrop: 4 percent

Cabbart and similar soils: 2 percent

Delpoint and similar soils: 2 percent

Megonot and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

141C—Marmarth-Cabbart loams, 2 to 8 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Marmarth and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 5.6 inches

Cabbart and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Delpoint and similar soils: 2 percent

Hinterland and similar soils: 2 percent

Rentsac and similar soils: 2 percent

Tanna and similar soils: 2 percent

Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

141D—Marmarth-Cabbart loams, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Marmarth and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 8 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 5.6 inches

Cabbart and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 8 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Delpoint and similar soils: 2 percent
 Reedpoint and similar soils: 2 percent
 Rentsac and similar soils: 2 percent
 Tanna and similar soils: 2 percent
 Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

142C—Tanna clay loam, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 85 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Additional Components

Ethridge and similar soils: 8 percent
 Marmarth and similar soils: 4 percent
 Cabbart and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

144B—Evanston loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Evanston and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.9 inches

Additional Components

Ethridge and similar soils: 5 percent
 Kremlin and similar soils: 5 percent
 Marmarth and similar soils: 3 percent
 Tanna and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

144C—Evanston loam, 4 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Evanston and similar soils

Composition: 85 percent
Geomorphic description: Microlow on fan
Slope: 4 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.9 inches

Additional Components

Ethridge and similar soils: 8 percent
 Kremlin and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

144D—Evanston loam, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Evanston and similar soils

Composition: 85 percent

Geomorphic description: Microlow on fan

Slope: 8 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.9 inches

Additional Components

Ethridge and similar soils: 8 percent

Kremlin and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

145C—Boxwell, calcareous-Cabbart loams, 2 to 8 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Boxwell and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.9 inches

Cabbart and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Delpoint and similar soils: 3 percent

Tanna and similar soils: 3 percent

Marmarth and similar soils: 2 percent

Rentsac and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

146B—Ethridge clay loam, 1 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Ethridge and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 1 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Additional Components

Evanston and similar soils: 5 percent
 Richey and similar soils: 4 percent
 Creed and similar soils: 3 percent
 Kremlin and similar soils: 2 percent
 Gerdrum and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

146C—Ethridge clay loam, 4 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Ethridge and similar soils

Composition: 87 percent
Geomorphic description: Fan and swale
Slope: 4 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Additional Components

Tanna and similar soils: 6 percent
Note: This soil exists on the upper one third of the landform.
 Evanston and similar soils: 5 percent
 Creed and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

147B—Kremlin loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Kremlin and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.3 inches

Additional Components

Evanston and similar soils: 4 percent
 Yamacall and similar soils: 4 percent
 Delpoint and similar soils: 2 percent
 Ethridge and similar soils: 2 percent
 Tanna and similar soils: 2 percent
 Cabbart and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

147C—Kremlin loam, 4 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Kremlin and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.3 inches

Additional Components

Yamacall and similar soils: 7 percent
 Evanston and similar soils: 4 percent
 Kremlin and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

147D—Kremlin loam, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Kremlin and similar soils

Composition: 88 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.3 inches

Additional Components

Yamacall and similar soils: 5 percent
 Ethridge and similar soils: 4 percent
 Evanston and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

148E—Cabbart-Cambeth complex, 4 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 4 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Cambeth and similar soils

Composition: 40 percent
Geomorphic description: Base slope footslope on hill
Slope: 4 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Silt loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.2 inches

Additional Components

Delpoint and similar soils: 5 percent
 Tanna and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

150C—Kobase clay loam, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Kobase and similar soils

Composition: 85 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Additional Components

Ethridge and similar soils: 4 percent

Megonot and similar soils: 4 percent

Yamacall and similar soils: 3 percent

Cabbart and similar soils: 2 percent

Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

150D—Kobase clay loam, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Kobase and similar soils

Composition: 85 percent

Geomorphic description: Plain and swale

Slope: 8 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Additional Components

Megonot and similar soils: 4 percent

Yamacall and similar soils: 4 percent

Richey and similar soils: 3 percent

Delpoint and similar soils: 2 percent

Ethridge and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

151C—Cabbart-Boxwell loams, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Boxwell and similar soils

Composition: 40 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Additional Components

Delpoint and similar soils: 3 percent
 Kremlin and similar soils: 2 percent
 Marmarth and similar soils: 2 percent
 Megonot and similar soils: 2 percent
 Hinterland and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

151D—Cabbart-Boxwell loams, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 3.0 inches

Boxwell and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Additional Components

Delpoint and similar soils: 3 percent
 Tanna and similar soils: 3 percent
 Kremlin and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

153C—Ethridge-Reedpoint complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Ethridge and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Reedpoint and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Dimmick and similar soils: 3 percent
 Kremlin and similar soils: 3 percent
 Hinterland and similar soils: 2 percent
 Tanna and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

153D—Ethridge-Reedpoint complex, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Ethridge and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Reedpoint and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Dimmick and similar soils: 3 percent
 Hinterland and similar soils: 2 percent
 Kremlin and similar soils: 2 percent

Tanna and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

154E—Evanston-Reedpoint complex, 8 to 35 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Evanston and similar soils

Composition: 45 percent
Geomorphic description: Base slope toeslope on hill
Slope: 8 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.9 inches

Reedpoint and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Marmarth and similar soils: 5 percent
 Delpoint and similar soils: 3 percent
 Hinterland and similar soils: 2 percent
 Tanna and similar soils: 2 percent

Yamacall and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

155E—Cabbart-Delpoint loams, moist, 15 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 3.8 inches

Additional Components

Reedpoint and similar soils: 3 percent

Yamacall and similar soils: 3 percent

Yawdim and similar soils: 2 percent

Rentsac and similar soils: 1 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

156C—Twilight-Blacksheep fine sandy loams, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Twilight and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Fine sandy loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Sandy residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Blacksheep and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Fine sandy loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Sandy residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.2 inches

Additional Components

Cabbart and similar soils: 3 percent
 Delpoint and similar soils: 3 percent
 Chinook and similar soils: 2 percent
 Reedpoint and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

157F—Cabbart, moist-Delpoint-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 60 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope backslope on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 15 percent

Geomorphic description:

- Base slope backslope on escarpment
- Base slope footslope on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Rock outcrop

Composition: 15 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Reedpoint and similar soils: 3 percent
 Yamacall and similar soils: 3 percent
 Yawdim and similar soils: 3 percent
 Tanna and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

159A—Marcott cobbly clay loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 4,300 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 130 days

Major Component Description

Marcott and similar soils

Composition: 85 percent

Geomorphic description: Flood plain

Slope: 0 to 2 percent

Elevation: 3,750 to 4,300 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Surface layer texture: Cobbly clay loam

Drainage class: Somewhat poorly drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 6.7 inches

Additional Components

Beaverell and similar soils: 5 percent
 Larry and similar soils: 5 percent
 Swampcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

161B—Martinsdale gravelly loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Martinsdale and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.7 inches

Additional Components

Fairfield and similar soils: 4 percent
 Farnuf and similar soils: 4 percent
 Shawmut and similar soils: 4 percent
 Tamaneen and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

161C—Martinsdale gravelly loam, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Martinsdale and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.0 inches

Additional Components

Fairfield and similar soils: 4 percent
 Farnuf and similar soils: 4 percent
 Shawmut and similar soils: 4 percent
 Tamaneen and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

163C—Absher clay, 0 to 8 percent slopes

Setting

Landscape: Sedimentary plains
Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Absher and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay
Drainage class: Well drained
Parent material: Silty and clayey alluvium weathered from igneous and sedimentary rock
Native plant cover type: Rangeland
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.9 inches

Additional Components

Creed and similar soils: 4 percent
 Gerdrum and similar soils: 4 percent
 Lallie and similar soils: 3 percent
 Ledger and similar soils: 2 percent
 Thibadeau and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

166B—Richey silty clay, 0 to 4 percent slopes**Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Richey and similar soils***Composition:* 86 percent*Geomorphic description:* Tread on stream terrace*Slope:* 0 to 4 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Silty clay*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 8.7 inches**Additional Components**

Ethridge and similar soils: 9 percent

Kremlin and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

166C—Richey silty clay, 4 to 8 percent slopes**Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Richey and similar soils***Composition:* 88 percent*Geomorphic description:* Fan*Slope:* 4 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Silty clay*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 8.7 inches**Additional Components**

Tanna and similar soils: 5 percent

Note: This soil exists on the upper one third of the
landform.

Kremlin and similar soils: 4 percent

Ethridge and similar soils: 3 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

167F—Yawdim-Birney-Rock outcrop complex, 15 to 60 percent slopes**Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Yawdim and similar soils***Composition:* 40 percent*Geomorphic description:*

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment
- Side slope shoulder on escarpment

Slope: 15 to 60 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay*Depth to bedrock (paralithic):* 10 to 20 inches*Drainage class:* Well drained

Parent material: Clayey residuum weathered from
calcareous shale

Native plant cover type: Rangeland*Available water capacity:* Mainly 2.0 inches**Birney and similar soils***Composition:* 30 percent*Geomorphic description:*

- Base slope toeslope on escarpment
- Base slope footslope on escarpment

Slope: 15 to 60 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days

Surface layer texture: Loam
Drainage class: Well drained
Parent material: Gravelly colluvium
Native plant cover type: Forestland
Available water capacity: Mainly 4.7 inches

Rock outcrop

Composition: 20 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Escarpment

Additional Components

Cabbart and similar soils: 4 percent
 Rentsac and similar soils: 3 percent
 Yamacall and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

168D—Chinook fine sandy loam, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Chinook and similar soils

Composition: 85 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Fine sandy loam
Drainage class: Well drained
Parent material: Sandy residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 8.2 inches

Additional Components

Twilight and similar soils: 5 percent
 Blacksheep and similar soils: 4 percent
 Cabbart and similar soils: 3 percent
 Delpoint and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

169C—Ethridge-Tanna clay loams, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Ethridge and similar soils

Composition: 53 percent
Geomorphic description: Plain and swale
Slope: 4 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Tanna and similar soils

Composition: 43 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Additional Components

Cabbart and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**170C—Gerdrum-Creed complex,
0 to 8 percent slopes****Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Gerdrum and similar soils***Composition:* 50 percent*Geomorphic description:* Microlow on plain*Slope:* 0 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay loam*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Salt affected:* Saline within 30 inches*Sodium affected:* Sodic within 30 inches*Available water capacity:* Mainly 6.0 inches**Creed and similar soils***Composition:* 40 percent*Geomorphic description:* Microhigh on plain*Slope:* 0 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Sodium affected:* Sodic within 30 inches*Available water capacity:* Mainly 6.4 inches**Additional Components**

Ethridge and similar soils: 4 percent

Tanna and similar soils: 3 percent

Absher and similar soils: 2 percent

Yawdim and similar soils: 1 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

**172C—Tanna-Boxwell, calcareous,
complex, 2 to 8 percent slopes****Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Tanna and similar soils***Composition:* 50 percent*Geomorphic description:* Plain and swale*Slope:* 2 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay loam*Depth to bedrock (paralithic):* 20 to 40 inches*Drainage class:* Well drained*Parent material:* Clayey residuum weathered from
sandstone and shale*Native plant cover type:* Rangeland*Available water capacity:* Mainly 4.2 inches**Boxwell and similar soils***Composition:* 40 percent*Geomorphic description:* Plain and swale*Slope:* 2 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Loam*Depth to bedrock (paralithic):* 20 to 40 inches*Drainage class:* Well drained*Parent material:* Loamy residuum weathered from
sandstone and siltstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 5.0 inches**Additional Components**

Cabbart and similar soils: 5 percent

Ethridge and similar soils: 2 percent

Marmarth and similar soils: 2 percent

Kremlin and similar soils: 1 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

172D—Tanna-Boxwell, calcareous, complex, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Boxwell and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Additional Components

Cabbart and similar soils: 5 percent
 Ethridge and similar soils: 2 percent
 Marmarth and similar soils: 2 percent
 Kremlin and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

174C—Sweetgrass clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Sweetgrass and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey over sandy and gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 5.6 inches

Additional Components

Danvers and similar soils: 3 percent
 Roy and similar soils: 3 percent
 Shawmut and similar soils: 3 percent
 Tamaneen and similar soils: 3 percent
 Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

176C—Reedwest-Cabba loams, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale

Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Amherst and similar soils: 3 percent
 Farnuf and similar soils: 3 percent
 Absarokee and similar soils: 2 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

178F—Castner-Roy complex, 15 to 60 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent
Geomorphic description: Side slope backslope on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches
Note: This soil exists on the lower one third of the landform.

Roy and similar soils

Composition: 40 percent
Geomorphic description: Side slope backslope on escarpment
Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches
Note: This soil exists on the upper one third of the landform.

Additional Components

Wayden and similar soils: 5 percent
Note: This soil exists on the lower two thirds of the landform.
 Absarokee and similar soils: 3 percent
 Amherst and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

179F—Cabba-Rock outcrop complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 70 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope backslope on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Doney and similar soils: 3 percent

Macar and similar soils: 3 percent

Castner and similar soils: 2 percent

Wayden and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

181C—Cabba-Winifred clay loams, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.4 inches

Winifred and similar soils

Composition: 40 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 5.3 inches

Additional Components

Castner and similar soils: 3 percent

Wayden and similar soils: 3 percent

Linwell and similar soils: 2 percent

Work and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

181D—Cabba-Winifred clay loams, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.4 inches

Winifred and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 5.3 inches

Additional Components

Wayden and similar soils: 3 percent

Amherst and similar soils: 2 percent

Castner and similar soils: 2 percent

Work and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

182C—Roy gravelly clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly clay loam

Drainage class: Well drained

Parent material: Gravelly glaciofluvial deposits

Native plant cover type: Rangeland

Available water capacity: Mainly 4.5 inches

Additional Components

Tamaneen and similar soils: 5 percent

Bacbuster and similar soils: 3 percent

Danvers and similar soils: 3 percent

Shawmut and similar soils: 3 percent

Turner and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

182D—Roy gravelly clay loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly clay loam

Drainage class: Well drained

Parent material: Gravelly glaciofluvial deposits

Native plant cover type: Rangeland

Available water capacity: Mainly 4.5 inches

Additional Components

Shawmut and similar soils: 5 percent

Roy and similar soils: 3 percent

Tamaneen and similar soils: 3 percent

Danvers and similar soils: 2 percent

Turner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

183A—Tamaneen gravelly loam, 0 to 2 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Tamaneen and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 6.5 inches

Additional Components

Fairfield and similar soils: 5 percent
 Roy and similar soils: 5 percent
 Danvers and similar soils: 3 percent
 Shawmut and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

183B—Tamaneen clay loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Tamaneen and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium

Native plant cover type: Rangeland
Available water capacity: Mainly 6.7 inches

Additional Components

Roy and similar soils: 9 percent
 Danvers and similar soils: 5 percent
 Sagedale and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

183C—Tamaneen gravelly clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Tamaneen and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 6.5 inches

Additional Components

Danvers and similar soils: 6 percent
 Martinsdale and similar soils: 3 percent
 Roy and similar soils: 3 percent
 Shawmut and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

184D—Absarokee-Shambo loams, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Absarokee and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Shambo and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Work and similar soils: 5 percent
 Reedwest and similar soils: 3 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

185C—Amor-Castner complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 6.1 inches

Castner and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Ticell and similar soils: 4 percent
 Wayden and similar soils: 4 percent
 Reedwest and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

185D—Amor-Castner complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 6.1 inches

Castner and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.6 inches

Additional Components

Cabba and similar soils: 4 percent

Wayden and similar soils: 3 percent

Reedwest and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

186D—Castner channery loam, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 85 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.6 inches

Additional Components

Rock outcrop: 5 percent

Absarokee and similar soils: 3 percent

Cabba and similar soils: 3 percent

Amherst and similar soils: 2 percent

Farnuf and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

186E—Castner channery loam, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 85 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Additional Components

Rock outcrop: 4 percent

Absarokee and similar soils: 3 percent

Shawmut and similar soils: 3 percent

Wayden and similar soils: 3 percent

Cabba and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

188C—Linwell clay loam, 2 to 8 percent slopes**Setting***Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days**Major Component Description****Linwell and similar soils***Composition:* 85 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Clay loam*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 9.1 inches**Additional Components**

Overfelt and similar soils: 4 percent

Shambo and similar soils: 4 percent

Work and similar soils: 4 percent

Roy and similar soils: 3 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

189C—Shambo gravelly clay loam, 2 to 8 percent slopes**Setting***Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days**Major Component Description****Shambo and similar soils***Composition:* 85 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Gravelly clay loam*Drainage class:* Well drained*Parent material:* Loamy alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 10.4 inches**Additional Components**

Farnuf and similar soils: 8 percent

Linwell and similar soils: 4 percent

Work and similar soils: 3 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

190C—Danvers gravelly clay loam, 2 to 8 percent slopes**Setting***Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days**Major Component Description****Danvers and similar soils***Composition:* 85 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Gravelly clay loam*Drainage class:* Well drained*Parent material:* Loamy alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 6.4 inches**Additional Components**

Tamaneen and similar soils: 7 percent

Sagedale and similar soils: 4 percent

Shawmut and similar soils: 4 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

191C—Castner-Farnuf complex, 2 to 8 percent slopes**Setting***Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Farnuf and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.6 inches

Additional Components

Cabba and similar soils: 4 percent
 Absarokee and similar soils: 3 percent
 Wayden and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

192D—Castner-Shambo complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Shambo and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Amherst and similar soils: 3 percent
 Reedwest and similar soils: 3 percent
 Cabba and similar soils: 2 percent
 Wayden and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

193C—Farnuf-Winifred complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Farnuf and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium

Native plant cover type: Rangeland
Available water capacity: Mainly 9.6 inches

Winifred and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 5.3 inches

Additional Components

Wayden and similar soils: 4 percent
 Reedwest and similar soils: 3 percent
 Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

194C—Linwell-Amor complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Linwell and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.1 inches

Amor and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Additional Components

Doney and similar soils: 4 percent
 Ticell and similar soils: 4 percent
 Macar and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

196B—Yamacall-Bigsag family complex, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Yamacall and similar soils

Composition: 50 percent
Geomorphic description: Stream terrace
Slope: 1 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.6 inches

Bigsag and similar soils

Composition: 40 percent
Geomorphic description: Depression and flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay
Drainage class: Very poorly drained
Parent material: Clayey colluvium weathered from sandstone and shale

Native plant cover type: Rangeland
Water table: Present
Ponding duration: Long
Salt affected: Saline within 30 inches
Available water capacity: Mainly 7.8 inches

Additional Components

Lallie and similar soils: 5 percent
 Kobase and similar soils: 3 percent
 Klayent and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

197C—Work-Castner complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 60 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.6 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Absarokee and similar soils: 5 percent
 Cabba and similar soils: 3 percent
 Amherst and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

197D—Work-Castner complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 60 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.6 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Absarokee and similar soils: 4 percent
 Cabba and similar soils: 2 percent
 Farnuf and similar soils: 2 percent
 Macar and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

201F—Yawdim-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yawdim and similar soils

Composition: 70 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment
- Side slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Rentsac and similar soils: 4 percent

Cabbart and similar soils: 2 percent

Megonot and similar soils: 2 percent

Reedpoint and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

202C—Castner-Absarokee complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.6 inches

Absarokee and similar soils

Composition: 40 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Silty and clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.1 inches

Additional Components

Work and similar soils: 4 percent

Amherst and similar soils: 2 percent

Cabba and similar soils: 2 percent

Wayden and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

202D—Castner-Absarokee complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Absarokee and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Additional Components

Work and similar soils: 3 percent
 Amherst and similar soils: 2 percent
 Cabba and similar soils: 2 percent
 Wayden and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

202E—Castner-Absarokee complex, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Absarokee and similar soils

Composition: 40 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Additional Components

Work and similar soils: 5 percent
 Amherst and similar soils: 2 percent
 Amor and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

204A—Dimmick silty clay, 0 to 2 percent slopes

Setting

Elevation: 4,200 to 5,600 feet

Mean annual precipitation: 10 to 19 inches

Frost-free period: 95 to 125 days

Major Component Description

Dimmick and similar soils

Composition: 85 percent

Geomorphic description: Depression and plain

Slope: 0 to 2 percent

Elevation: 4,200 to 5,600 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Silty clay

Drainage class: Very poorly drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Water table: Present

Ponding duration: Long

Available water capacity: Mainly 10.3 inches

Additional Components

Gerdrum and similar soils: 6 percent

Ethridge and similar soils: 5 percent

Macar and similar soils: 0 to 4 percent

Yamacall and similar soils: 0 to 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

206D—Hinterland-Rentsac-Cabbart complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Hinterland and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Rentsac and similar soils

Composition: 30 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Cabbart and similar soils

Composition: 20 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Reedpoint and similar soils: 4 percent

Delpoint and similar soils: 2 percent

Marmarth and similar soils: 2 percent

Tanna and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

208F—Cabba-Castner complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Castner and similar soils

Composition: 43 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Additional Components

Doney and similar soils: 3 percent

Bacbuster and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

209C—Fairfield gravelly loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Fairfield and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.9 inches

Additional Components

Shawmut and similar soils: 7 percent

Reedwest and similar soils: 4 percent

Tamaneen and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

209D—Fairfield gravelly loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Fairfield and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.9 inches

Additional Components

Martinsdale and similar soils: 6 percent
 Tamaneen and similar soils: 5 percent
 Shawmut and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

210D—Cabba loam, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 85 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Vershal and similar soils: 4 percent
 Ticell and similar soils: 3 percent
 Absarokee and similar soils: 2 percent
 Amor and similar soils: 2 percent

Doney and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

210E—Cabba loam, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 85 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Vershal and similar soils: 5 percent
 Castner and similar soils: 3 percent
 Doney and similar soils: 3 percent
 Rock outcrop: 2 percent
 Shawmut and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

213A—Korchea-Fairway-Albicalis loams, channeled, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Fairway and similar soils

Composition: 45 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Somewhat poorly drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 9.1 inches

Korchea and similar soils

Composition: 30 percent
Geomorphic description: Flood-plain step
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 10.1 inches

Albicalis and similar soils

Composition: 15 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Poorly drained
Parent material: Fine-loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 10.7 inches

Additional Components

Kobase and similar soils: 5 percent
 Kremlin and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

215B—Macar loam, calcareous surface, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Macar and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.4 inches

Additional Components

Sagedale and similar soils: 5 percent
 Work and similar soils: 4 percent
 Shambo and similar soils: 3 percent
 Shawmut and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

215C—Macar loam, calcareous surface, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Macar and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Additional Components

Shambo and similar soils: 7 percent

Sagedale and similar soils: 5 percent

Shawmut and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

215D—Macar loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Macar and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Additional Components

Shambo and similar soils: 8 percent

Sagedale and similar soils: 5 percent

Linwell and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

216A—Clunton clay loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Frost-free period: 85 to 125 days

Major Component Description

Clunton and similar soils

Composition: 90 percent

Geomorphic description: Depression and flood plain

Slope: 0 to 2 percent

Elevation: 3,750 to 6,000 feet

Effective annual precipitation: 10 to 19 inches

Frost-free period: 85 to 125 days

Surface layer texture: Muck

Drainage class: Very poorly drained

Parent material: Fine-loamy alluvium over sandy and gravelly alluvium

Native plant cover type: Rangeland

Flooding: Frequent

Water table: Present

Ponding duration: Brief

Available water capacity: Mainly 10.2 inches

Additional Components

Fairway and similar soils: 5 percent

Soapcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

217A—Korchea loam, 0 to 2 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Korchea and similar soils

Composition: 85 percent

Geomorphic description: Stream terrace

Slope: 0 to 2 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Flooding: Rare

Available water capacity: Mainly 10.1 inches

Additional Components

Fairway and similar soils: 8 percent

Shambo and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

218C—Breeton sandy loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Breeton and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Sandy loam
Drainage class: Well drained
Parent material: Coarse-loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.9 inches

Additional Components

Perma and similar soils: 5 percent
 Turner and similar soils: 4 percent
 Beaverton and similar soils: 3 percent
 Farnuf and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

218D—Breeton sandy loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Breeton and similar soils

Composition: 85 percent
Geomorphic description: Fan

Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Sandy loam
Drainage class: Well drained
Parent material: Coarse-loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.9 inches

Additional Components

Farnuf and similar soils: 5 percent
 Perma and similar soils: 5 percent
 Winspect and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

219A—Klayent clay loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 6,000 feet
Mean annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days

Major Component Description

Klayent and similar soils

Composition: 85 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 6,000 feet
Effective annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days
Surface layer texture: Clay loam
Drainage class: Poorly drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 8.5 inches

Additional Components

Lallie and similar soils: 10 percent
 Fairway and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

220C—Amor-Work complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Work and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.6 inches

Additional Components

Cabba and similar soils: 2 percent
 Castner and similar soils: 2 percent
 Linwell and similar soils: 2 percent
 Vershal and similar soils: 2 percent
 Absarokee and similar soils: 1 percent
 Winifred and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

220D—Amor-Work complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Work and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.6 inches

Additional Components

Cabba and similar soils: 2 percent
 Castner and similar soils: 2 percent
 Ticell and similar soils: 2 percent
 Vershal and similar soils: 2 percent
 Absarokee and similar soils: 1 percent
 Winifred and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

221C—Amor-Farnuf loams, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Farnuf and similar soils

Composition: 42 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.6 inches

Additional Components

Cabba and similar soils: 3 percent
 Reedwest and similar soils: 3 percent
 Work and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

224B—Shambo loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shambo and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Linwell and similar soils: 4 percent
 Sagedale and similar soils: 4 percent
 Work and similar soils: 4 percent
 Fairway and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

224C—Shambo loam, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shambo and similar soils

Composition: 85 percent
Geomorphic description: Fan

Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Farnuf and similar soils: 6 percent
 Work and similar soils: 3 percent
 Fairfield and similar soils: 2 percent
 Linwell and similar soils: 2 percent
 Roy and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

224D—Shambo loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shambo and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Farnuf and similar soils: 7 percent
 Linwell and similar soils: 3 percent
 Shawmut and similar soils: 3 percent
 Bowery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

225C—Amor-Cabba loams, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 4 percent
 Reedwest and similar soils: 3 percent
 Ticell and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

225D—Amor-Cabba loams, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Amor and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 4 percent
Reedwest and similar soils: 3 percent
Ticell and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

227F—Cabba, moist-Rock outcrop complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 70 percent
Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 2.0 inches

Rock outcrop

Composition: 20 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Escarpment

Additional Components

Castner and similar soils: 3 percent
Vershal and similar soils: 3 percent
Doney and similar soils: 2 percent
Wayden and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

229C—Absarokee-Cabba loams, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description**Absarokee and similar soils**

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Winifred and similar soils: 4 percent
 Castner and similar soils: 2 percent
 Linwell and similar soils: 2 percent
 Ticell and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**229D—Absarokee-Cabba loams,
 8 to 15 percent slopes**
Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description**Absarokee and similar soils**

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 3 percent
 Winifred and similar soils: 3 percent
 Linwell and similar soils: 2 percent
 Ticell and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

230B—Farnuf loam, 0 to 4 percent slopes
Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Farnuf and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Shambo and similar soils: 5 percent

Work and similar soils: 4 percent

Absarokee and similar soils: 3 percent

Reedwest and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

230C—Farnuf loam, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Farnuf and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 4 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Beaverton and similar soils: 5 percent

Shambo and similar soils: 4 percent

Turner and similar soils: 3 percent

Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

230D—Farnuf loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Farnuf and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Winspect and similar soils: 6 percent

Bowery and similar soils: 5 percent

Breeton and similar soils: 3 percent

Work and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

231C—Doney-Cabba loams, 2 to 8 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Doney and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.4 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 3 percent
 Wayden and similar soils: 3 percent
 Ticell and similar soils: 2 percent
 Reedwest and similar soils: 1 percent
 Sagedale and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

231D—Doney-Cabba loams, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Doney and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.4 inches

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Sagedale and similar soils: 4 percent
 Castner and similar soils: 3 percent
 Macar and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

232B—Work loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.7 inches

Additional Components

Absarokee and similar soils: 3 percent
 Castner and similar soils: 3 percent
 Farnuf and similar soils: 3 percent
 Linwell and similar soils: 3 percent
 Tamaneen and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

232C—Work loam, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.7 inches

Additional Components

Linwell and similar soils: 9 percent
 Shawmut and similar soils: 4 percent
 Shambo and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

236B—Verson loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Verson and similar soils

Composition: 89 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 6.3 inches

Additional Components

Ethridge and similar soils: 6 percent
 Radersburg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

236C—Verson loam, 4 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Verson and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 5.6 inches

Additional Components

Sieben and similar soils: 4 percent
 Ethridge and similar soils: 3 percent
 Evanston and similar soils: 3 percent
 Radersburg and similar soils: 3 percent
 Kremlin and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

237B—Thibadeau loam, saline, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Thibadeau and similar soils

Composition: 85 percent

Geomorphic description: Flood plain

Slope: 0 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Drainage class: Moderately well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Salt affected: Saline within 30 inches

Available water capacity: Mainly 6.5 inches

Additional Components

Absher and similar soils: 5 percent

Lallie and similar soils: 5 percent

Ledger and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

238C—Sagedale-Cabba complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Sagedale and similar soils

Composition: 60 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Cabba and similar soils

Composition: 30 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Additional Components

Doney and similar soils: 4 percent

Wayden and similar soils: 4 percent

Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

238F—Sagedale-Cabba complex, 8 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Sagedale and similar soils

Composition: 60 percent

Geomorphic description: Base slope on escarpment and fan

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Cabba and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Additional Components

Doney and similar soils: 4 percent

Wayden and similar soils: 3 percent

Castner and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

239C—Sixbeacon gravelly loam, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Sixbeacon and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 4.4 inches

Additional Components

Kremlin and similar soils: 5 percent

Sieben and similar soils: 5 percent

Yamacall and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

241D—Yawdim clay loam, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Yawdim and similar soils

Composition: 85 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.4 inches

Additional Components

Megonot and similar soils: 4 percent

Cabbart and similar soils: 3 percent

Delpoint and similar soils: 3 percent

Rentsac and similar soils: 3 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

245C—Lonna silt loam, 2 to 8 percent slopes**Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Lonna and similar soils***Composition:* 85 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Silt loam*Drainage class:* Well drained*Parent material:* Silty alluvium*Native plant cover type:* Rangeland*Salt affected:* Saline within 30 inches*Sodium affected:* Sodic within 30 inches*Available water capacity:* Mainly 9.0 inches**Additional Components**

Ethridge and similar soils: 8 percent

Yamacall and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

249B—Soapcreek clay loam, 0 to 2 percent slopes**Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Soapcreek and similar soils***Composition:* 85 percent*Geomorphic description:* Flood plain*Slope:* 0 to 2 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay loam*Drainage class:* Somewhat poorly drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Present*Available water capacity:* Mainly 9.4 inches**Additional Components**

Fairway and similar soils: 5 percent

Lallie and similar soils: 5 percent

Meadowcreek and similar soils: 3 percent

Richey and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

250A—Lallie family, silty clay, 0 to 2 percent slopes**Setting***Elevation:* 3,750 to 6,000 feet*Mean annual precipitation:* 10 to 19 inches*Frost-free period:* 85 to 125 days**Major Component Description****Lallie and similar soils***Composition:* 85 percent*Geomorphic description:* Flood plain*Slope:* 0 to 2 percent*Elevation:* 3,750 to 6,000 feet*Effective annual precipitation:* 10 to 19 inches*Frost-free period:* 85 to 125 days*Surface layer texture:* Silty clay*Drainage class:* Poorly drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Flooding:* Frequent*Water table:* Present*Salt affected:* Saline within 30 inches*Available water capacity:* Mainly 9.3 inches**Additional Components**

Fairway and similar soils: 5 percent

Soapcreek and similar soils: 5 percent

Swampcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

251B—Radersburg gravelly loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Radersburg and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.4 inches

Additional Components

Verson and similar soils: 5 percent
 Ethridge and similar soils: 4 percent
 Sieben and similar soils: 4 percent
 Tanna and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

252B—Roy-Swampcreek complex, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 50 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits

Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches

Swampcreek and similar soils

Composition: 40 percent
Geomorphic description: Swale and tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly sandy clay loam
Drainage class: Poorly drained
Parent material: Loamy over gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 4.6 inches

Additional Components

Beaverton and similar soils: 5 percent
 Newtown and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

253C—Reedwest-Castner complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 60 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain

Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Cabba and similar soils: 3 percent
 Vershal and similar soils: 3 percent
 Ticell and similar soils: 2 percent
 Absarokee and similar soils: 1 percent
 Work and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

253D—Reedwest-Castner complex, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Castner and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Farnuf and similar soils: 6 percent
 Beenom and similar soils: 2 percent
 Ticell and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

253E—Reedwest-Castner complex, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 50 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Castner and similar soils

Composition: 43 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Farnuf and similar soils: 4 percent
 Ticell and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

254C—Winifred clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Winifred and similar soils

Composition: 85 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 5.3 inches

Additional Components

Cabba and similar soils: 4 percent
 Wayden and similar soils: 3 percent
 Absarokee and similar soils: 2 percent
 Amor and similar soils: 2 percent
 Doney and similar soils: 2 percent
 Linwell and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

255B—Thibadeau, saline-Absher family complex, 0 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Thibadeau and similar soils

Composition: 50 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Salt affected: Saline within 30 inches
Available water capacity: Mainly 6.5 inches

Absher and similar soils

Composition: 40 percent
Geomorphic description: Stream terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay
Drainage class: Somewhat poorly drained
Parent material: Silty and clayey alluvium
Native plant cover type: Rangeland
Water table: Present
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

Additional Components

Albicalis and similar soils: 5 percent
 Gerdrum and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

256F—Sixbeacon-Reedpoint complex, 15 to 60 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Sixbeacon and similar soils

Composition: 60 percent

Geomorphic description: Base slope on escarpment and fan

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 4.4 inches

Reedpoint and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.4 inches

Additional Components

Verson and similar soils: 4 percent

Rentsac and similar soils: 3 percent

Yawdim and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

257B—Absher-Bigsag families, clays, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Absher and similar soils

Composition: 60 percent

Geomorphic description: Flood plain

Slope: 0 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay

Drainage class: Somewhat poorly drained

Parent material: Silty and clayey alluvium

Native plant cover type: Rangeland

Water table: Present

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 3.8 inches

Bigsag and similar soils

Composition: 25 percent

Geomorphic description: Flood plain

Slope: 2 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay

Drainage class: Very poorly drained

Parent material: Clayey alluvium weathered from sandstone and shale

Native plant cover type: Rangeland

Water table: Present

Ponding duration: Long

Salt affected: Saline within 30 inches

Available water capacity: Mainly 7.8 inches

Additional Components

Havre and similar soils: 10 percent

Yamacall and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

259D—Wayden clay, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 85 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.7 inches

Additional Components

Cabba and similar soils: 5 percent
 Sagedale and similar soils: 5 percent
 Winifred and similar soils: 3 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

260C—Wayden-Doney complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.7 inches

Doney and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.4 inches

Additional Components

Cabba and similar soils: 5 percent
 Sagedale and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

261C—Absarokee-Wayden complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Absarokee and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained

Parent material: Silty and clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.1 inches

Wayden and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Additional Components

Work and similar soils: 3 percent

Cabba and similar soils: 2 percent

Castner and similar soils: 2 percent

Sagedale and similar soils: 2 percent

Amherst and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

262D—Wayden-Castner-Cabba complex, 2 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Castner and similar soils

Composition: 30 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.6 inches

Cabba and similar soils

Composition: 20 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Additional Components

Sagedale and similar soils: 3 percent

Doney and similar soils: 2 percent

Rock outcrop: 2 percent

Vershal and similar soils: 2 percent

Ticell and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

265C—Sagedale clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Sagedale and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Macar and similar soils: 7 percent

Work and similar soils: 6 percent

Marcott and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

265D—Sagedale clay loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Sagedale and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.6 inches

Additional Components

Work and similar soils: 8 percent

Macar and similar soils: 4 percent

Marcott and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

266B—Sweetgrass clay, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Sweetgrass and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay

Drainage class: Well drained

Parent material: Clayey over sandy and gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 5.6 inches

Additional Components

Roy and similar soils: 4 percent

Shawmut and similar soils: 4 percent

Work and similar soils: 4 percent

Danvers and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

267B—Beaverton gravelly sandy clay loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Beaverton and similar soils

Composition: 85 percent

Geomorphic description: Tread on stream terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly sandy clay loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 3.5 inches

Additional Components

Beaverton and similar soils: 5 percent
 Meadowcreek and similar soils: 5 percent
 Roy and similar soils: 3 percent
 Turner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

268B—Overfelt-Roy complex, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Overfelt and similar soils

Composition: 50 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey over gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 6.2 inches

Roy and similar soils

Composition: 45 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches

Additional Components

Linwell and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

269C—Danvers loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Danvers and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 6.8 inches

Additional Components

Tamaneen and similar soils: 7 percent
 Absarokee and similar soils: 4 percent
 Martinsdale and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

270C—Bacbuster-Castner complex, 2 to 8 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Bacbuster and similar soils

Composition: 60 percent
Geomorphic description: Plain and swale

Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Cabba and similar soils: 4 percent
 Linwell and similar soils: 3 percent
 Vershal and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

270D—Bacbuster-Castner complex, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Bacbuster and similar soils

Composition: 60 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Bigsag and similar soils: 4 percent
 Korchea and similar soils: 3 percent
 Linwell and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

271B—Sweetgrass gravelly loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Sweetgrass and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Clayey over sandy and gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 5.4 inches

Additional Components

Tamaneen and similar soils: 5 percent

Turner and similar soils: 5 percent

Wayden and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

274B—Work clay loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.6 inches

Additional Components

Roy and similar soils: 7 percent

Danvers and similar soils: 3 percent

Sagedale and similar soils: 3 percent

Shambo and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

274C—Work clay loam, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 4 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.6 inches

Additional Components

Roy and similar soils: 4 percent

Danvers and similar soils: 3 percent

Sagedale and similar soils: 3 percent

Shambo and similar soils: 3 percent

Marcott and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

274D—Work clay loam, 8 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.6 inches

Additional Components

Shambo and similar soils: 4 percent

Fairfield and similar soils: 3 percent

Linwell and similar soils: 3 percent

Shawmut and similar soils: 3 percent

Macar and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

274E—Work clay loam, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.6 inches

Additional Components

Linwell and similar soils: 7 percent

Farnuf and similar soils: 5 percent

Shambo and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

275B—Overfelt clay loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Overfelt and similar soils

Composition: 85 percent

Geomorphic description: Tread on stream terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey over gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 6.2 inches

Additional Components

Roy and similar soils: 5 percent

Tamaneen and similar soils: 4 percent

Marcott and similar soils: 3 percent

Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

276A—Larry clay loam, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 6,000 feet

Mean annual precipitation: 10 to 19 inches

Frost-free period: 85 to 125 days

Major Component Description

Larry and similar soils

Composition: 85 percent

Geomorphic description: Flood plain

Slope: 0 to 2 percent

Elevation: 3,750 to 6,000 feet

Effective annual precipitation: 10 to 19 inches

Frost-free period: 85 to 125 days

Surface layer texture: Clay loam

Drainage class: Poorly drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Available water capacity: Mainly 10.3 inches

Additional Components

Marcott and similar soils: 5 percent

Soapcreek and similar soils: 5 percent

Swampcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**277B—Marcott-Larry complex,
0 to 4 percent slopes****Setting**

Elevation: 3,750 to 4,300 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 130 days

Major Component Description**Marcott and similar soils**

Composition: 50 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 4,300 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 130 days
Surface layer texture: Cobbly clay loam
Drainage class: Somewhat poorly drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

Larry and similar soils

Composition: 40 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 4,300 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 130 days
Surface layer texture: Clay loam
Drainage class: Poorly drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 10.3 inches

Additional Components

Beaverell and similar soils: 4 percent
 Fairway and similar soils: 3 percent
 Swampcreek and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**278B—Perma gravelly loam,
0 to 4 percent slopes****Setting**

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description**Perma and similar soils**

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Meadowcreek and similar soils: 5 percent
 Nesda and similar soils: 5 percent
 Roy and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**278C—Perma gravelly loam,
4 to 8 percent slopes****Setting**

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description**Perma and similar soils**

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Shawmut and similar soils: 5 percent
 Roy and similar soils: 4 percent
 Breeton and similar soils: 3 percent
 Shambo and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

279C—Shambo clay loam, calcareous, 4 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shambo and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Linwell and similar soils: 8 percent
 Sagedale and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

281F—Shawmut-Castner complex, 15 to 60 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shawmut and similar soils

Composition: 60 percent
Geomorphic description: Side slope backslope on escarpment
Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches
Note: This soil exists on the upper one third of the landform.

Castner and similar soils

Composition: 30 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Winifred and similar soils: 3 percent
 Amor and similar soils: 2 percent
 Rock outcrop: 2 percent
 Wayden and similar soils: 2 percent
 Sagedale and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

282B—Bowery clay loam, 0 to 4 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Bowery and similar soils

Composition: 85 percent

Geomorphic description: Tread on stream terrace

Slope: 0 to 4 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Additional Components

Laceycreek and similar soils: 5 percent

Shambo and similar soils: 4 percent

Farnuf and similar soils: 3 percent

Korchea and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

283F—Castner-Wayden complex, moist, 15 to 60 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Wayden and similar soils

Composition: 40 percent

Geomorphic description:

- Side slope shoulder on escarpment
- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Additional Components

Cabba and similar soils: 2 percent

Mowbray and similar soils: 2 percent

Rock outcrop: 2 percent

Vershal and similar soils: 2 percent

Work and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

284C—Shawmut gravelly loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Shawmut and similar soils

Composition: 93 percent

Geomorphic description: Tread on terrace

Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Additional Components

Tamaneen and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

284D—Shawmut gravelly loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Shawmut and similar soils

Composition: 88 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Additional Components

Tamaneen and similar soils: 5 percent
 Roy and similar soils: 4 percent
 Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

286F—Wayden-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 70 percent

Geomorphic description:

- Side slope shoulder on escarpment
- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.7 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Farnuf and similar soils: 6 percent
 Albicallis and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

288B—Turner sandy clay loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Turner and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Sandy clay loam
Drainage class: Well drained
Parent material: Loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Additional Components

Roy and similar soils: 9 percent
 Meadowcreek and similar soils: 3 percent
 Shawmut and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

289A—Swampcreek gravelly sandy clay loam, 0 to 2 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Swampcreek and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 2 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly sandy clay loam
Drainage class: Poorly drained
Parent material: Loamy over gravelly alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 4.6 inches

Additional Components

Beaverton and similar soils: 5 percent
 Lallie and similar soils: 5 percent
 Meadowcreek and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

290C—Breeton loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Breeton and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Coarse-loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.9 inches

Additional Components

Turner and similar soils: 6 percent
 Korchea and similar soils: 5 percent
 Fairway and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

291B—Beaverton very cobbly loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Beaverton and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Surface layer texture: Very cobbly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 3.3 inches

Additional Components

Roy and similar soils: 10 percent
 Turner and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

294B—Roy gravelly loam, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 91 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Additional Components

Turner and similar soils: 5 percent
 Turner, seeped and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

295B—Roy-Turner complex, 0 to 4 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 60 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches

Turner and similar soils

Composition: 30 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Sandy clay loam
Drainage class: Well drained
Parent material: Loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Additional Components

Beaverton and similar soils: 4 percent
 Beaverton and similar soils: 3 percent
 Turner, seeped and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

296B—Blossberg cobbly loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Note: This map unit is strongly influenced by water seepage from irrigation ditches. It is mainly located in an area near the confluence of the Yellowstone and Boulder Rivers.

Major Component Description

Blossberg and similar soils

Composition: 85 percent

Geomorphic description: Tread on stream terrace

Slope: 0 to 4 percent

Elevation: 3,750 to 4,300 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 130 days

Surface layer texture: Cobbly loam

Rock fragments on the soil surface: 0.01 to 0.10 percent cobbles

Drainage class: Poorly drained

Parent material: Loamy over sandy and gravelly alluvium

Native plant cover type: Rangeland

Water table: Present

Available water capacity: Mainly 5.1 inches

Note: This soil becomes supersaturated in the fine-loamy A and Bt horizons before starting to drain through the sandy-skeletal substratum. The soil is wet throughout the growing season.

Additional Components

Swampcreek and similar soils: 10 percent

Radersburg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

303D—Winspect cobbly loam, 4 to 15 percent slopes

Setting

Elevation: 4,200 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Winspect and similar soils

Composition: 85 percent

Geomorphic description: Nose slope summit on moraine

Slope: 4 to 15 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Cobbly loam

Drainage class: Well drained

Parent material: Gravelly glaciofluvial deposits

Native plant cover type: Rangeland

Available water capacity: Mainly 6.1 inches

Additional Components

Shawmut and similar soils: 6 percent

Shambo and similar soils: 4 percent

Work and similar soils: 4 percent

Fairfield, stony and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

303E—Winspect very cobbly loam, 15 to 35 percent slopes

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Winspect and similar soils

Composition: 85 percent

Geomorphic description: Nose slope summit on moraine

Slope: 15 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Very cobbly loam

Drainage class: Well drained

Parent material: Gravelly glaciofluvial deposits

Native plant cover type: Rangeland

Available water capacity: Mainly 6.2 inches

Additional Components

Shambo and similar soils: 4 percent
 Work and similar soils: 4 percent
 Shawmut and similar soils: 3 percent
 Fairfield, stony and similar soils: 2 percent
 Winspect, bouldery and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

304C—Shawmut-Shambo complex, 2 to 8 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Shawmut and similar soils

Composition: 53 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Shambo and similar soils

Composition: 40 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Tamaneen and similar soils: 3 percent
 Meadowcreek and similar soils: 2 percent
 Winspect and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

304D—Shawmut-Shambo complex, 8 to 15 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Shawmut and similar soils

Composition: 50 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Shambo and similar soils

Composition: 40 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Additional Components

Farnuf and similar soils: 4 percent
 Winspect and similar soils: 4 percent
 Tamaneen and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

307E—Cabba-Doney loams, 8 to 35 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Doney and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Additional Components

Castner and similar soils: 4 percent

Rock outcrop: 3 percent

Wayden and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

308C—Meagher gravelly loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Meagher and similar soils

Composition: 85 percent

Geomorphic description: Tread on terrace

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 6.1 inches

Additional Components

Farnuf and similar soils: 5 percent

Martinsdale and similar soils: 5 percent

Shawmut and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

309E—Ticell-Amor loams, 8 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Ticell and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Amor and similar soils

Composition: 40 percent
Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 8 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 6.1 inches

Additional Components

Macar and similar soils: 5 percent
 Castner and similar soils: 3 percent
 Cabba and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

310E—Winspect-Ticell complex, 15 to 35 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Winspect and similar soils

Composition: 60 percent
Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill

Slope: 15 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 6.5 inches

Ticell and similar soils

Composition: 30 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Additional Components

Amor and similar soils: 6 percent
 Ticell, stony and similar soils: 3 percent
 Winspect, bouldery and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

311C—Roy, extremely stony-Turner complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 65 percent
Geomorphic description: Tread on stream terrace
Slope: 0 to 4 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam

Rock fragments on the soil surface: 3 to 15 percent stones, 2 to 3 feet apart

Drainage class: Well drained

Parent material: Gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 4.5 inches

Turner and similar soils

Composition: 30 percent

Geomorphic description: Tread on stream terrace

Slope: 2 to 8 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Sandy clay loam

Rock fragments on the soil surface: 3 to 15 percent stones, 2 to 3 feet apart

Drainage class: Well drained

Parent material: Loamy over sandy and gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 4.9 inches

Additional Components

Turner, seeped and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

312D—Vershal very channery loam, 2 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Vershal and similar soils

Composition: 85 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.6 inches

Additional Components

Cabba and similar soils: 3 percent

Castner and similar soils: 3 percent

Ticell and similar soils: 3 percent

Amor and similar soils: 2 percent

Doney and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

312F—Vershal very channery loam, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Vershal and similar soils

Composition: 85 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.6 inches

Additional Components

Amor and similar soils: 4 percent

Castner and similar soils: 4 percent

Wayden and similar soils: 4 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

313C—Roy-Tamaneen complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Roy and similar soils

Composition: 50 percent
Geomorphic description: Tread on terrace
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches

Tamaneen and similar soils

Composition: 40 percent
Geomorphic description: Tread on terrace
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Clayey over gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 6.5 inches

Additional Components

Farnuf and similar soils: 4 percent
 Shawmut and similar soils: 4 percent
 Beaverton and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

330C—Absarokee-Amherst complex, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Absarokee and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Amherst and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 4 percent
 Beenom and similar soils: 2 percent
 Wayden and similar soils: 2 percent
 Winifred and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

330D—Absarokee-Amherst complex, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Absarokee and similar soils

Composition: 51 percent
Geomorphic description: Plain and swale

Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Silty and clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.1 inches

Amherst and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Castner and similar soils: 3 percent
 Rock outcrop: 2 percent
 Wayden and similar soils: 2 percent
 Winifred and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

331F—Wayden-Castner complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 50 percent
Geomorphic description:

- Side slope shoulder on escarpment
- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.7 inches

Castner and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Cabba and similar soils: 3 percent
 Shambo and similar soils: 3 percent
 Farnuf and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

332D—Ticell loam, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ticell and similar soils

Composition: 85 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Additional Components

Cabba and similar soils: 3 percent
 Castner and similar soils: 3 percent
 Work and similar soils: 3 percent
 Amor and similar soils: 2 percent
 Reedwest and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

332E—Ticell loam, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ticell and similar soils

Composition: 85 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Additional Components

Cabba and similar soils: 4 percent
 Amor and similar soils: 3 percent
 Doney and similar soils: 3 percent

Vershal and similar soils: 3 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

333F—Shawmut-Castner-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Shawmut and similar soils

Composition: 40 percent
Geomorphic description: Base slope backslope on escarpment
Slope: 15 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Forestland
Available water capacity: Mainly 4.3 inches

Castner and similar soils

Composition: 33 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Stony loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Rock outcrop

Composition: 20 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Escarpment

Additional Components

Cabba and similar soils: 4 percent
 Reedwest and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

335D—Cabba-Castner-Amherst complex, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Castner and similar soils

Composition: 30 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Amherst and similar soils

Composition: 20 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly clay loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Additional Components

Absarokee and similar soils: 3 percent
 Reedwest and similar soils: 3 percent
 Wayden and similar soils: 3 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

336E—Sinnigam-Wayden complex, moist, 15 to 45 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Sinnigam and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 45 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very channery clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Wayden and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill
- Side slope shoulder on hill

Slope: 15 to 45 percent

Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.7 inches

Additional Components

Absarokee and similar soils: 3 percent
 Castner and similar soils: 3 percent
 Amherst and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

337C—Work gravelly clay loam, 2 to 8 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.4 inches

Additional Components

Shawmut and similar soils: 5 percent
 Danvers and similar soils: 4 percent
 Roy and similar soils: 3 percent
 Tamaneen and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

337D—Work gravelly clay loam, 8 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Work and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 8 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.4 inches

Additional Components

Shawmut and similar soils: 5 percent
 Danvers and similar soils: 4 percent
 Roy and similar soils: 3 percent
 Tamaneen and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

342E—Ashbon-Winkler-Weedzunit complex, 15 to 35 percent slopes

Setting

Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ashbon and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 25 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 1.2 inches

Winkler and similar soils

Composition: 30 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope footslope on hill
- Base slope backslope on hill

Slope: 15 to 35 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly colluvium weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 3.6 inches

Weedzunit and similar soils

Composition: 20 percent
Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Fine sandy loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Rangeland
Available water capacity: Mainly 4.0 inches

Additional Components

Work and similar soils: 4 percent
 Farnuf and similar soils: 3 percent
 Perma and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

343F—Ashbon-Winkler-Rock outcrop complex, 35 to 60 percent slopes

Setting

Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ashbon and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 35 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 1.2 inches

Winkler and similar soils

Composition: 30 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope footslope on hill
- Base slope backslope on hill

Slope: 35 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly colluvium weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 3.6 inches

Rock outcrop

Composition: 20 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Hill

Additional Components

Perma and similar soils: 5 percent
 Weedzunit and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

344F—Vision-Sweetweed-Whitlash complex, 25 to 60 percent slopes

Setting

Elevation: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Vision and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Gravelly colluvium weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Sweetweed and similar soils

Composition: 30 percent

Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill

Slope: 25 to 35 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 9.1 inches

Whitlash and similar soils

Composition: 20 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 2.0 inches

Additional Components

Rock outcrop: 5 percent

Winkler and similar soils: 3 percent

Ashbon and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

345D—Weedzunit-Ashbon complex, 4 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Weedzunit and similar soils

Composition: 50 percent

Geomorphic description:

- Side slope footslope on hill
- Side slope backslope on hill

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Fine sandy loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Residuum weathered from tuff breccia

Native plant cover type: Rangeland

Available water capacity: Mainly 4.0 inches

Ashbon and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Additional Components

Shambo and similar soils: 4 percent
 Farnuf and similar soils: 3 percent
 Pianohill and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

345E—Weedzunit-Ashbon complex, 15 to 45 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Weedzunit and similar soils

Composition: 50 percent
Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Fine sandy loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Rangeland
Available water capacity: Mainly 4.0 inches

Ashbon and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 45 percent

Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Rangeland
Available water capacity: Mainly 1.2 inches

Additional Components

Breeton and similar soils: 4 percent
 Shambo and similar soils: 4 percent
 Pianohill and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

346E—Farnuf-Reedwest-Shawmut complex, 15 to 35 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Farnuf and similar soils

Composition: 43 percent
Geomorphic description: Base slope toeslope on hill
Slope: 15 to 25 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Stony loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.1 inches

Reedwest and similar soils

Composition: 33 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill

Slope: 15 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Shawmut and similar soils

Composition: 20 percent
Geomorphic description: Side slope backslope on hill
Slope: 15 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Additional Components

Winspect and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

347D—Cheadle-Lymanson-Gilispie complex, 2 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Cheadle and similar soils

Composition: 40 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone or gabbro

Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Lymanson and similar soils

Composition: 30 percent
Geomorphic description: Mountainflank backslope on mountain
Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Gilispie and similar soils

Composition: 20 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank shoulder on mountain

Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Additional Components

Adel and similar soils: 5 percent
 Bridger and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

347E—Cheadle-Lymanson-Gilispie complex, 15 to 35 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Lymanson and similar soils

Composition: 40 percent

Geomorphic description: Mountainflank backslope on mountain

Slope: 15 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Cheadle and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 15 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.1 inches

Gillispie and similar soils

Composition: 20 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank shoulder on mountain

Slope: 15 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Additional Components

Adel and similar soils: 4 percent

Bridger and similar soils: 4 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

348E—Lymanson-Cheadle-Adel complex, 8 to 35 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Lymanson and similar soils

Composition: 40 percent

Geomorphic description: Mountainflank backslope on mountain

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Cheadle and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland
Available water capacity: Mainly 1.1 inches

Adel and similar soils

Composition: 20 percent
Geomorphic description: Mountain and swale
Slope: 8 to 35 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.2 inches

Additional Components

Bridger and similar soils: 4 percent
 Pintlar and similar soils: 4 percent
 Gilispie and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

349D—Cheadle channery loam, 2 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Cheadle and similar soils

Composition: 85 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Gilispie and similar soils: 5 percent
 Lymanson and similar soils: 4 percent
 Merino and similar soils: 4 percent
 Tongue River and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

350F—Castner-Mowbray-Rock outcrop complex, 25 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Castner and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 25 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Mowbray and similar soils

Composition: 32 percent
Geomorphic description: Base slope on escarpment and fan
Slope: 25 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Channery loam
Drainage class: Well drained
Parent material: Gravelly colluvium weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.7 inches

Rock outcrop*Composition:* 20 percent*Definition:* Rock outcrop consists mainly of areas of exposed hard bedrock.*Geomorphic description:* Escarpment**Additional Components**

Winspect and similar soils: 3 percent

Perma and similar soils: 2 percent

Reedwest and similar soils: 2 percent

Wayden and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**351D—Whitlash-Pianohill complex,
4 to 15 percent slopes**
Setting*Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days**Major Component Description****Whitlash and similar soils***Composition:* 50 percent*Geomorphic description:*

- Nose slope shoulder on hill
- Nose slope summit on hill

Slope: 4 to 15 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Gravelly loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from tuff breccia*Native plant cover type:* Rangeland*Available water capacity:* Mainly 2.0 inches**Pianohill and similar soils***Composition:* 40 percent*Geomorphic description:*

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill

Slope: 4 to 15 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Loam*Depth to bedrock (lithic):* 20 to 40 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from tuff breccia*Native plant cover type:* Rangeland*Available water capacity:* Mainly 5.2 inches**Additional Components**

Ashbon and similar soils: 5 percent

Weedzunit and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**351E—Whitlash-Pianohill complex,
15 to 35 percent slopes**
Setting*Field investigation intensity:* Order 2*Elevation:* 4,200 to 6,000 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days**Major Component Description****Whitlash and similar soils***Composition:* 50 percent*Geomorphic description:*

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 45 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Gravelly loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from tuff breccia*Native plant cover type:* Rangeland*Available water capacity:* Mainly 2.0 inches**Pianohill and similar soils***Composition:* 40 percent*Geomorphic description:*

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill

Slope: 15 to 35 percent*Elevation:* 4,200 to 6,000 feet*Effective annual precipitation:* 15 to 19 inches*Frost-free period:* 85 to 115 days*Surface layer texture:* Loam

Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Rangeland
Available water capacity: Mainly 5.2 inches

Additional Components

Ashbon and similar soils: 5 percent
 Weedzunit and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

352E—Perma-Rock outcrop complex, 15 to 45 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Perma and similar soils

Composition: 70 percent
Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill
- Side slope backslope on hill

Slope: 15 to 45 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Cobbly loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Rock outcrop

Composition: 15 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Hill

Additional Components

Breeton and similar soils: 5 percent
 Shambo and similar soils: 5 percent
 Weedzunit and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

353F—Ashbon-Rock outcrop-Winkler complex, 35 to 60 percent slopes

Setting

Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ashbon and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 35 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 1.2 inches

Rock outcrop

Composition: 30 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Hill

Winkler and similar soils

Composition: 20 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope footslope on hill
- Base slope backslope on hill

Slope: 35 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very gravelly sandy loam
Drainage class: Somewhat excessively drained
Parent material: Gravelly colluvium weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 3.6 inches

Additional Components

Sweetweed and similar soils: 5 percent

Whitlash and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

354F—Vision-Whitlash-Rock outcrop complex, 35 to 60 percent slopes

Setting

Elevation: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Vision and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Gravelly colluvium weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Whitlash and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 2.0 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Hill

Additional Components

Sweetweed and similar soils: 4 percent

Ashbon and similar soils: 3 percent

Winkler and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

355F—Doney-Cabba, moist loams, 35 to 60 percent slopes

Setting

Elevation: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Doney and similar soils

Composition: 50 percent

Geomorphic description:

- Base slope footslope on escarpment
- Base slope backslope on escarpment
- Side slope backslope on escarpment

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Cabba and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 35 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 2.0 inches

Additional Components

Castner and similar soils: 5 percent
 Macar and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

356D—Redchief gravelly loam, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Redchief and similar soils

Composition: 90 percent
Geomorphic description: Microhigh on outwash plain
Slope: 4 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.9 inches

Additional Components

Libeg and similar soils: 4 percent
 Adel and similar soils: 3 percent
 Melville and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

357D—Cabba-Vershal complex, 4 to 15 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 4 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Vershal and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 4 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.6 inches

Additional Components

Amherst and similar soils: 5 percent
 Reedwest and similar soils: 3 percent
 Beenom and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

357E—Cabba-Vershal complex, 15 to 45 percent slopes

Setting

Elevation: 3,900 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 45 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Vershal and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 45 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.6 inches

Additional Components

Doney and similar soils: 4 percent

Rock outcrop: 3 percent

Macar and similar soils: 2 percent

Farnuf and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

358E—Tongue River-Danaher loams, 15 to 35 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 50 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 15 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Danaher and similar soils

Composition: 40 percent

Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase toeslope on mountain

Slope: 15 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Silty and clayey colluvium or alluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.3 inches

Additional Components

Cheadle and similar soils: 5 percent

Knep and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

359F—Fifer-Cheadle-Monaberg complex, 25 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Fifer and similar soils

Composition: 40 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank shoulder on mountain

Slope: 35 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Cheadle and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 35 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.1 inches

Monaberg and similar soils

Composition: 25 percent

Geomorphic description: Mountainbase toeslope on mountain

Slope: 25 to 45 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.0 inches

Additional Components

Adel and similar soils: 3 percent

Knep and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

360D—Knep family-Warwood loams, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Knep and similar soils

Composition: 50 percent

Geomorphic description:

- Mountainbase toeslope on mountain
- Mountainflank backslope on mountain

Slope: 8 to 15 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.7 inches

Warwood and similar soils

Composition: 40 percent

Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase toeslope on mountain

Slope: 4 to 15 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.3 inches

Additional Components

Danaher and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

361E—Cowood very channery loam, 4 to 25 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Cowood and similar soils

Composition: 85 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 4 to 25 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone over gabbro

Native plant cover type: Forestland

Available water capacity: Mainly 1.6 inches

Additional Components

Arrowpeak and similar soils: 5 percent

Timberlin and similar soils: 5 percent

Worock and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

362F—Wayden-Castner-Rock outcrop complex, 25 to 60 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 2,620 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Wayden and similar soils

Composition: 40 percent

Geomorphic description:

- Side slope shoulder on escarpment
- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 25 to 60 percent

Elevation: 2,620 to 4,590 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Castner and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 25 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.3 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Sagedale and similar soils: 5 percent

Winifred and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

363E—Kobase-Rentsac-Megonot complex, 4 to 25 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Kobase and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill

Slope: 4 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Drainage class: Well drained

Parent material: Clayey alluvium weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 9.4 inches

Rentsac and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 4 to 25 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.3 inches

Megonot and similar soils

Composition: 20 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill

Slope: 8 to 25 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale

Native plant cover type: Rangeland

Available water capacity: Mainly 3.9 inches

Additional Components

Richey and similar soils: 3 percent

Yamacall and similar soils: 3 percent

Cabbart and similar soils: 2 percent

Delpoint and similar soils: 1 percent

Reedpoint and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

364E—Absarokee-Bowery loams, 15 to 45 percent slopes

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Absarokee and similar soils

Composition: 60 percent

Geomorphic description:

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill

Slope: 15 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Silty and clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.1 inches

Bowery and similar soils

Composition: 30 percent

Geomorphic description: Hill and swale

Slope: 15 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.6 inches

Additional Components

Bacbuster and similar soils: 3 percent

Work and similar soils: 3 percent

Farnuf and similar soils: 2 percent

Reedwest and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

365C—Megonot-Cabbart complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Megonot and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale

Native plant cover type: Rangeland

Available water capacity: Mainly 3.9 inches

Cabbart and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Additional Components

Kobase and similar soils: 4 percent

Yawdim and similar soils: 4 percent

Delpoint and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

366C—Tanna, calcareous,-Rentsac complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Tanna, calcareous and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.2 inches

Rentsac and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Additional Components

Greybear and similar soils: 4 percent
 Reedpoint and similar soils: 3 percent
 Yawdim and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

366D—Tanna, calcareous,-Rentsac complex, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Tanna, calcareous and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Rentsac and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Additional Components

Greybear and similar soils: 4 percent
 Reedpoint and similar soils: 3 percent
 Yawdim and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

367D—Rentsac-Reedpoint complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Reedpoint and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Cabbart and similar soils: 4 percent
 Delpoint and similar soils: 3 percent
 Yawdim and similar soils: 2 percent
 Magonot and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

367E—Rentsac-Reedpoint complex, 15 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Reedpoint and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.4 inches

Additional Components

Cabbart and similar soils: 3 percent
 Delpoint and similar soils: 2 percent
 Magonot and similar soils: 2 percent
 Yawdim and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

368E—Rentsac-Tanna-Rock outcrop complex, 8 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Tanna and similar soils

Composition: 30 percent
Geomorphic description:

- Base slope footslope on hill
- Base slope backslope on hill
- Side slope backslope on hill

Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Rock outcrop

Composition: 15 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Hill

Additional Components

Cabbart and similar soils: 5 percent
 Mego not and similar soils: 4 percent
 Ethridge and similar soils: 3 percent
 Yawdim and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

369D—Rentsac-Tanna complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 50 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Tanna and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Additional Components

Hinterland and similar soils: 4 percent
 Cabbart and similar soils: 3 percent
 Reedpoint and similar soils: 2 percent
 Ethridge and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

369E—Rentsac-Tanna complex, 15 to 35 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Tanna and similar soils

Composition: 40 percent
Geomorphic description:

- Base slope footslope on hill
- Base slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent
Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Additional Components

Reedpoint and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Ethridge and similar soils: 2 percent
 Hinterland and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

370D—Greybear-Rentsac complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Greybear and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 40 to 60 inches
Drainage class: Well drained
Parent material: Clayey alluvium over clayey residuum weathered from shale
Native plant cover type: Rangeland
Available water capacity: Mainly 8.3 inches

Rentsac and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Ethridge and similar soils: 4 percent
 Magonot and similar soils: 2 percent
 Reedpoint and similar soils: 2 percent
 Yawdim and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

371D—Whitlash cobbly sandy loam, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Whitlash and similar soils

Composition: 90 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from gabbro
Native plant cover type: Rangeland
Available water capacity: Mainly 2.0 inches

Additional Components

Beenom and similar soils: 4 percent
 Reedwest and similar soils: 3 percent
 Amherst and similar soils: 2 percent
 Castner and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

371E—Whitlash cobbly sandy loam, 15 to 35 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Whitlash and similar soils

Composition: 90 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Additional Components

Beenom and similar soils: 3 percent

Amherst and similar soils: 2 percent

Castner and similar soils: 2 percent

Reedwest and similar soils: 2 percent

Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

372D—Castner-Amherst complex, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.6 inches

Amherst and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly clay loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from andesite

Native plant cover type: Rangeland

Available water capacity: Mainly 2.5 inches

Additional Components

Absarokee and similar soils: 3 percent

Beenom and similar soils: 3 percent

Reedwest and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

372E—Castner-Amherst complex, 15 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Castner and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Amherst and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly clay loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from andesite
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Absarokee and similar soils: 3 percent
 Beenom and similar soils: 3 percent
 Reedwest and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

373D—Ticell-Castner complex, 2 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Ticell and similar soils

Composition: 70 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Castner and similar soils

Composition: 20 percent
Geomorphic description: Knoll and plain
Slope: 2 to 15 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Doney and similar soils: 5 percent
 Cabba and similar soils: 3 percent
 Vershal and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

374F—Cabbart, moist-Delpoint-Rock outcrop complex, 15 to 45 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment
- Side slope backslope on escarpment

Slope: 15 to 45 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 3.0 inches

Delpoint and similar soils

Composition: 30 percent

Geomorphic description:

- Base slope backslope on escarpment
- Base slope footslope on escarpment
- Side slope backslope on escarpment

Slope: 15 to 35 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Rock outcrop

Composition: 15 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Blacksheep and similar soils: 5 percent

Twilight and similar soils: 5 percent

Yamacall and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

375D—Cabbart-Rentsac, moist, complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Cabbart and similar soils

Composition: 60 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.0 inches

Rentsac and similar soils

Composition: 30 percent

Geomorphic description: Knoll and plain

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from calcareous sandstone

Native plant cover type: Forestland

Available water capacity: Mainly 1.4 inches

Additional Components

Blacksheep and similar soils: 3 percent

Twilight and similar soils: 3 percent

Delpoint and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

376E—Chinook-Twilight fine sandy loams, 8 to 25 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Chinook and similar soils

Composition: 50 percent

Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill
- Plain
- Swale

Slope: 8 to 25 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Fine sandy loam

Drainage class: Well drained

Parent material: Sandy residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 8.1 inches

Twilight and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill
- Plain
- Swale

Slope: 8 to 25 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Fine sandy loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Sandy residuum weathered from calcareous sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Rentsac and similar soils: 4 percent

Blacksheep and similar soils: 3 percent

Cabbart and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

377F—Tongue River-Cabba, moist-Adel loams, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 50 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Fifer and similar soils

Composition: 25 percent

Geomorphic description: Mountaintop summit on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 2.7 inches

Adel and similar soils

Composition: 15 percent

Geomorphic description: Mountain and swale

Slope: 15 to 25 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.2 inches

Additional Components

Knep and similar soils: 5 percent
Monaberg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

378D—Melville cobbly loam, 2 to 15 percent slopes, stony

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Melville and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Cobbly loam
Rock fragments on the soil surface: 0.01 to 0.10 percent stones, 27 to 67 feet apart
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 9.0 inches

Additional Components

Bridger and similar soils: 5 percent
Melville and similar soils: 5 percent
Redchief and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

379F—Tongue River-Arrowpeak, moist complex, 15 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 60 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 15 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 5.8 inches

Arrowpeak and similar soils

Composition: 30 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 30 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from gabbro
Native plant cover type: Forestland
Available water capacity: Mainly 1.3 inches

Additional Components

Cowood and similar soils: 3 percent
Danaher and similar soils: 3 percent
Timberlin and similar soils: 2 percent
Tongue River and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

381E—Duckcreek-Arrowpeak complex, 8 to 45 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Duckcreek and similar soils

Composition: 60 percent

Geomorphic description: Mountainflank backslope on mountain

Slope: 8 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 6.0 inches

Arrowpeak and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 8 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Rangeland

Available water capacity: Mainly 1.3 inches

Additional Components

Cheadle and similar soils: 3 percent

Doby and similar soils: 3 percent

Bridger and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

382E—Fifer-Knep complex, 15 to 45 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Fifer and similar soils

Composition: 45 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 15 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Knep and similar soils

Composition: 40 percent

Geomorphic description:

- Mountainbase backslope on mountain
- Mountainbase footslope on mountain
- Mountainflank backslope on mountain

Slope: 15 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Channery loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Cheadle and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Tongue River and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

383D—Fifer-Rock outcrop complex, 4 to 15 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Fifer and similar soils

Composition: 45 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 4 to 15 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Rock outcrop

Composition: 40 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Mountain

Additional Components

Cheadle and similar soils: 5 percent

Knep and similar soils: 5 percent

Tongue River and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

384E—Fifer-Cheadle complex, 15 to 45 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Fifer and similar soils

Composition: 45 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank shoulder on mountain

Slope: 15 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Cheadle and similar soils

Composition: 40 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 15 to 45 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.1 inches

Additional Components

Fifer and similar soils: 4 percent

Knep and similar soils: 4 percent

Tongue River and similar soils: 4 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

385E—Millerlake-Arrowpeak-Adel complex, 8 to 35 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Millerlake and similar soils

Composition: 40 percent

Geomorphic description: Mountainbase toeslope on mountain

Slope: 8 to 35 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.4 inches

Arrowpeak and similar soils

Composition: 25 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 15 to 35 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from gabbro
Native plant cover type: Rangeland
Available water capacity: Mainly 1.3 inches

Adel and similar soils

Composition: 20 percent
Geomorphic description: Mountain and swale
Slope: 8 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.2 inches

Additional Components

Lymanson and similar soils: 4 percent
 Pintlar and similar soils: 4 percent
 Whitore and similar soils: 4 percent
 Adel and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

386D—Millerlake loam, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Millerlake and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 4 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.4 inches

Additional Components

Adel and similar soils: 5 percent
 Bridger and similar soils: 5 percent
 Monaberg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

387E—Tongue River-Novary-Cowood complex, 4 to 45 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 50 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 15 to 45 percent

Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 5.8 inches

Novary and similar soils

Composition: 20 percent
Geomorphic description: Drainageway and mountain
Slope: 4 to 6 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Poorly drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 9.5 inches

Cowood and similar soils

Composition: 15 percent
Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 15 to 45 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone over gabbro
Native plant cover type: Forestland
Available water capacity: Mainly 1.6 inches

Additional Components

Arrowpeak and similar soils: 5 percent
 Danaher and similar soils: 5 percent
 Lymanson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

388D—Adel loam, 2 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Adel and similar soils

Composition: 85 percent
Geomorphic description: Mountain and swale
Slope: 2 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.2 inches

Additional Components

Bridger and similar soils: 5 percent
 Monaberg and similar soils: 5 percent
 Pintlar and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

391F—Tongue River-Timberlin complex, 35 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 50 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 35 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 5.8 inches

Timberlin and similar soils

Composition: 40 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 35 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy colluvium and/or residuum weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 4.1 inches

Additional Components

Cowood and similar soils: 4 percent
 Worock and similar soils: 4 percent
 Danaher and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

392E—Doney-Vershal complex, 8 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Doney and similar soils

Composition: 50 percent
Geomorphic description:

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill
- Plain
- Swale

Slope: 8 to 25 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Vershal and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill
- Knoll
- Plain

Slope: 8 to 35 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 4 to 10 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 0.6 inches

Additional Components

Cabba and similar soils: 2 percent
 Castner and similar soils: 2 percent
 Macar and similar soils: 2 percent
 Rock outcrop: 2 percent
 Sagedale and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

393E—Vershal-Reedwest complex, 8 to 35 percent slopes

Setting

Elevation: 4,200 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Vershal and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill
- Knoll
- Plain

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 4 to 10 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 0.6 inches

Reedwest and similar soils

Composition: 35 percent

Geomorphic description:

- Side slope backslope on hill
- Base slope backslope on hill
- Base slope footslope on hill
- Plain
- Swale

Slope: 8 to 35 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Additional Components

Absarokee and similar soils: 3 percent

Cabba and similar soils: 3 percent

Castner and similar soils: 3 percent

Farnuf and similar soils: 3 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

394D—Whitlash-Beenom complex, 4 to 15 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Whitlash and similar soils

Composition: 50 percent

Geomorphic description: Structural bench

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Beenom and similar soils

Composition: 35 percent

Geomorphic description: Structural bench

Slope: 4 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from andesite

Native plant cover type: Rangeland

Available water capacity: Mainly 2.8 inches

Additional Components

Absarokee and similar soils: 4 percent

Pianohill and similar soils: 4 percent

Rock outcrop: 4 percent

Amherst and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

395E—Whitlash-Beenom-Bacbuster complex, 8 to 25 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Whitlash and similar soils

Composition: 45 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 25 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Beenom and similar soils

Composition: 25 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Knoll
- Plain

Slope: 8 to 15 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from andesite

Native plant cover type: Rangeland

Available water capacity: Mainly 2.8 inches

Bacbuster and similar soils

Composition: 15 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill
- Plain
- Swale

Slope: 8 to 25 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 5.0 inches

Additional Components

Amherst and similar soils: 4 percent

Castner and similar soils: 4 percent

Pianohill and similar soils: 4 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

396C—Soapcreek-Lallie family complex, 0 to 8 percent slopes

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Soapcreek and similar soils

Composition: 59 percent

Geomorphic description: Flood-plain step

Slope: 0 to 4 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Clay loam

Drainage class: Somewhat poorly drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Present

Available water capacity: Mainly 9.4 inches

Lallie and similar soils

Composition: 25 percent

Geomorphic description: Flood plain

Slope: 0 to 2 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Silty clay

Drainage class: Poorly drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Flooding: Frequent
Water table: Present
Salt affected: Saline within 30 inches
Available water capacity: Mainly 9.3 inches

Additional Components

Linwell and similar soils: 5 percent
 Fairway and similar soils: 4 percent
 Macar and similar soils: 3 percent
 Doney and similar soils: 2 percent
 Larry and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

397E—Castner-Laceycreek-Bowery complex, 8 to 25 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Castner and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 25 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Laceycreek and similar soils

Composition: 25 percent
Geomorphic description: Hill and swale
Slope: 8 to 25 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days
Surface layer texture: Sandy loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.7 inches

Bowery and similar soils

Composition: 20 percent
Geomorphic description: Hill and swale
Slope: 8 to 25 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.6 inches

Additional Components

Work and similar soils: 5 percent
 Beenom and similar soils: 4 percent
 Farnuf and similar soils: 4 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

397F—Castner-Laceycreek-Bowery complex, 25 to 60 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Castner and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 25 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.4 inches

Laceycreek and similar soils

Composition: 25 percent

Geomorphic description: Drainageway and escarpment

Slope: 25 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Sandy loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.7 inches

Bowery and similar soils

Composition: 20 percent

Geomorphic description: Head slope backslope on escarpment

Slope: 25 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.6 inches

Additional Components

Beenom and similar soils: 4 percent

Farnuf and similar soils: 4 percent

Work and similar soils: 4 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

398F—Cabba very cobbly loam, 15 to 60 percent slopes

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Cabba and similar soils

Composition: 85 percent

Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Very cobbly loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.7 inches

Additional Components

Castner and similar soils: 5 percent

Doney and similar soils: 4 percent

Wayden and similar soils: 4 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

399F—Reedwest-Cabba-Castner complex, 15 to 60 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 38 percent

Geomorphic description:

- Side slope backslope on escarpment
- Base slope backslope on escarpment
- Base slope footslope on escarpment

Slope: 15 to 60 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.6 inches

Cabba and similar soils

Composition: 30 percent
Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 1.9 inches

Castner and similar soils

Composition: 25 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Bowery and similar soils: 3 percent
 Farnuf and similar soils: 3 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

400D—Bowery-Nesda-Bonebasin complex, 2 to 15 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Bowery and similar soils

Composition: 50 percent
Geomorphic description: Stream terrace
Slope: 2 to 15 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.6 inches

Nesda and similar soils

Composition: 25 percent
Geomorphic description: Flood plain
Slope: 2 to 4 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Available water capacity: Mainly 3.5 inches

Bonebasin and similar soils

Composition: 15 percent
Geomorphic description: Flood plain
Slope: 2 to 4 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Very poorly drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Present
Available water capacity: Mainly 5.9 inches

Additional Components

Korchea and similar soils: 4 percent
 Breeton and similar soils: 3 percent
 Meadowcreek and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

401B—Roy cobbly loam, 0 to 4 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Roy and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Rangeland
Available water capacity: Mainly 4.5 inches

Additional Components

Shawmut and similar soils: 5 percent
 Tamaneen and similar soils: 5 percent
 Work and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

402F—Reedwest-Rock outcrop complex, 15 to 60 percent slopes, very stony

Setting

Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Reedwest and similar soils

Composition: 68 percent
Geomorphic description:

- Side slope backslope on escarpment
- Base slope backslope on escarpment
- Base slope footslope on escarpment

Slope: 15 to 60 percent
Elevation: 3,900 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Forestland
Available water capacity: Mainly 4.6 inches

Rock outcrop

Composition: 20 percent
Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.
Geomorphic description: Dike

Additional Components

Farnuf and similar soils: 4 percent
 Cabba and similar soils: 3 percent
 Rubble land: 3 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

403F—Cabba-Castner-Rock outcrop complex, moist, 25 to 60 percent slopes

Setting

Field investigation intensity: Order 2
Elevation: 3,900 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days

Major Component Description

Cabba and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope backslope on escarpment
- Nose slope summit on escarpment
- Side slope backslope on escarpment

Slope: 25 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 2.0 inches

Castner and similar soils

Composition: 35 percent

Geomorphic description:

- Nose slope shoulder on escarpment
- Nose slope summit on escarpment

Slope: 25 to 60 percent

Elevation: 3,900 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Forestland

Available water capacity: Mainly 1.4 inches

Rock outcrop

Composition: 15 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Escarpment

Additional Components

Doney and similar soils: 4 percent

Wayden and similar soils: 3 percent

Sagedale and similar soils: 2 percent

Macar and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

404F—Lymanson-Doby-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Lymanson and similar soils

Composition: 40 percent

Geomorphic description: Mountainflank backslope on mountain

Slope: 15 to 50 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.0 inches

Doby and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountainflank backslope on mountain

Slope: 15 to 60 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Stony clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.3 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Mountain

Additional Components

Gilispie and similar soils: 4 percent

Adel and similar soils: 2 percent

Cheadle and similar soils: 2 percent

Tongue River and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

405F—Tongue River-Doby-Rock outcrop complex, 15 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Tongue River and similar soils

Composition: 40 percent

Geomorphic description:

- Mountainbase backslope on mountain
- Mountainbase footslope on mountain
- Mountainflank backslope on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy colluvium and/or residuum

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Doby and similar soils

Composition: 30 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountainflank backslope on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Stony clay loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 2.3 inches

Rock outcrop

Composition: 20 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Mountain

Additional Components

Lymanson and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

406E—Doney-Macar loams, 4 to 25 percent slopes

Setting

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Major Component Description

Doney and similar soils

Composition: 45 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill
- Side slope backslope on hill
- Plain
- Swale

Slope: 4 to 25 percent

Elevation: 4,200 to 6,000 feet

Effective annual precipitation: 15 to 19 inches

Frost-free period: 85 to 115 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Macar and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope toeslope on hill
- Base slope footslope on hill
- Plain
- Swale

Slope: 4 to 25 percent
Elevation: 4,200 to 6,000 feet
Effective annual precipitation: 15 to 19 inches
Frost-free period: 85 to 115 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.4 inches

Additional Components

Cabba and similar soils: 4 percent
 Amor and similar soils: 3 percent
 Sagedale and similar soils: 3 percent
 Wayden and similar soils: 3 percent
 Castner and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

407F—Danaher-Timberlin complex, 25 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Danaher and similar soils

Composition: 50 percent
Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase toeslope on mountain

Slope: 25 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Silty and clayey colluvium or alluvium
Native plant cover type: Forestland
Available water capacity: Mainly 9.3 inches

Timberlin and similar soils

Composition: 35 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 25 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy colluvium and/or residuum weathered from tuff breccia
Native plant cover type: Forestland
Available water capacity: Mainly 4.1 inches

Additional Components

Cheadle and similar soils: 5 percent
 Warwood and similar soils: 5 percent
 Arrowpeak and similar soils: 3 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

408E—Warwood-Timberlin-Cowood complex, 8 to 35 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Warwood and similar soils

Composition: 40 percent
Geomorphic description: Mountainbase footslope on mountain
Slope: 15 to 35 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Forestland
Available water capacity: Mainly 9.3 inches

Timberlin and similar soils

Composition: 30 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 8 to 35 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy colluvium and/or residuum weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 4.1 inches

Cowood and similar soils

Composition: 20 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 8 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Stony loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Forestland

Available water capacity: Mainly 1.8 inches

Additional Components

Danaher and similar soils: 4 percent

Arrowpeak and similar soils: 3 percent

Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

408F—Warwood-Timberlin-Cowood complex, 35 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Warwood and similar soils

Composition: 40 percent

Geomorphic description: Mountainbase footslope on mountain

Slope: 35 to 45 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.3 inches

Timberlin and similar soils

Composition: 30 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 35 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy colluvium and/or residuum weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 4.1 inches

Cowood and similar soils

Composition: 20 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 35 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Stony loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Forestland

Available water capacity: Mainly 1.5 inches

Additional Components

Pintlar and similar soils: 4 percent

Arrowpeak and similar soils: 2 percent

Danaher and similar soils: 2 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

409F—Merino-Elve-Rock outcrop complex, 25 to 80 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Merino and similar soils

Composition: 45 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 25 to 50 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very gravelly sandy loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from tuff breccia

Native plant cover type: Rangeland

Available water capacity: Mainly 1.0 inches

Elve and similar soils

Composition: 35 percent

Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase backslope on mountain
- Mountainflank backslope on mountain

Slope: 25 to 80 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very gravelly loam

Drainage class: Somewhat excessively drained

Parent material: Loamy alluvium weathered from volcanic breccia

Native plant cover type: Forestland

Available water capacity: Mainly 4.4 inches

Rock outcrop

Composition: 15 percent

Definition: Rock outcrop consists mainly of areas of exposed hard bedrock.

Geomorphic description: Mountain

Additional Components

Arrowpeak and similar soils: 3 percent

Monaberg and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

410E—Adel-Timberlin complex, 8 to 35 percent slopes

Setting

Landscape: Mountains

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Adel and similar soils

Composition: 60 percent

Geomorphic description: Mountain and swale

Slope: 8 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 10.2 inches

Timberlin and similar soils

Composition: 30 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 15 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy colluvium and/or residuum weathered from tuff breccia

Native plant cover type: Forestland

Available water capacity: Mainly 4.1 inches

Additional Components

Pintlar and similar soils: 5 percent

Bridger and similar soils: 3 percent

Warwood and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

411E—Pianohill-Whitlash-Adel complex, 15 to 45 percent slopes

Setting

Field investigation intensity: Order 2

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Pianohill and similar soils

Composition: 40 percent

Geomorphic description:

- Base slope footslope on hill
- Base slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Depth to bedrock (lithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Residuum weathered from tuff breccia

Native plant cover type: Rangeland

Available water capacity: Mainly 5.2 inches

Whitlash and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 15 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Gravelly loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from gabbro

Native plant cover type: Rangeland

Available water capacity: Mainly 2.0 inches

Bowery and similar soils

Composition: 15 percent

Geomorphic description: Hill and swale

Slope: 2 to 15 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.6 inches

Additional Components

Beenom and similar soils: 5 percent

Sawicki and similar soils: 5 percent

Weedzunit and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

412E—Lap-Winspect-Rock outcrop complex, 8 to 35 percent slopes

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Lap and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from limestone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.5 inches

Winspect and similar soils

Composition: 35 percent

Geomorphic description:

- Base slope backslope on hill
- Base slope footslope on hill

Slope: 8 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Cobbly loam

Drainage class: Well drained

Parent material: Gravelly colluvium weathered from limestone

Native plant cover type: Rangeland

Available water capacity: Mainly 6.5 inches

Rock outcrop*Composition:* 15 percent*Definition:* Rock outcrop consists mainly of areas of exposed hard bedrock.*Geomorphic description:* Hill**Additional Components**

Bowery and similar soils: 10 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**412F—Lap-Winspect complex,
35 to 70 percent slopes****Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days**Major Component Description****Lap and similar soils***Composition:* 45 percent*Geomorphic description:*

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 35 to 70 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Channery loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from limestone*Native plant cover type:* Forestland*Available water capacity:* Mainly 1.5 inches**Winspect and similar soils***Composition:* 35 percent*Geomorphic description:*

- Mountainbase footslope on mountain
- Mountainbase toeslope on mountain
- Mountainflank backslope on mountain

Slope: 35 to 70 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Cobbly loam*Drainage class:* Well drained*Parent material:* Gravelly colluvium weathered from limestone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 6.5 inches**Additional Components**

Bowery and similar soils: 10 percent

Rock outcrop: 10 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**413E—Cabba-Bowery complex,
2 to 60 percent slopes****Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days**Major Component Description****Cabba and similar soils***Composition:* 60 percent*Geomorphic description:*

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 15 to 60 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Gravelly loam*Depth to bedrock (paralithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Loamy residuum weathered from sandstone and siltstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 2.4 inches**Bowery and similar soils***Composition:* 25 percent*Geomorphic description:* Hill and swale*Slope:* 2 to 15 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Loamy alluvium or colluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 10.6 inches

Additional Components

Castner and similar soils: 4 percent
 Doney and similar soils: 4 percent
 Sweetweed and similar soils: 4 percent
 Rock outcrop: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

414D—Libeg, extremely bouldery-Adel complex, 4 to 15 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Libeg and similar soils

Composition: 50 percent

Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase backslope on mountain
- Mountainflank backslope on mountain

Slope: 4 to 15 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very cobbly loam

Rock fragments on the soil surface: 3 to 15 percent
 boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Gravelly till

Native plant cover type: Rangeland

Available water capacity: Mainly 4.0 inches

Adel and similar soils

Composition: 35 percent

Geomorphic description: Mountain and swale

Slope: 4 to 15 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 10.2 inches

Additional Components

Millerlake and similar soils: 5 percent
 Monaberg and similar soils: 5 percent
 Redchief and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

414F—Libeg-Libeg, extremely bouldery-Adel complex, 15 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Libeg and similar soils

Composition: 35 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountainbase footslope on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very cobbly sandy loam

Rock fragments on the soil surface: 3 to 15 percent
 boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Gravelly till

Native plant cover type: Rangeland

Available water capacity: Mainly 4.3 inches

Adel and similar soils

Composition: 25 percent

Geomorphic description: Mountain and swale

Slope: 15 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 10.2 inches

Libeg and similar soils*Composition:* 15 percent*Geomorphic description:*

- Mountainflank backslope on mountain
- Mountainbase footslope on mountain

Slope: 15 to 60 percent*Elevation:* 5,500 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Very cobbly sandy loam*Drainage class:* Well drained*Parent material:* Gravelly till*Native plant cover type:* Rangeland*Available water capacity:* Mainly 3.8 inches**Additional Components**

Monaberg and similar soils: 8 percent

Redchief and similar soils: 7 percent

Bridger and similar soils: 5 percent

Millerlake and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

**415F—Rocko-Adel complex,
15 to 45 percent slopes****Setting***Elevation:* 5,500 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days**Major Component Description****Rocko and similar soils***Composition:* 60 percent*Geomorphic description:* Mountainflank backslope on mountain*Slope:* 15 to 45 percent*Elevation:* 5,500 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Cobbly loam*Rock fragments on the soil surface:* 0.1 to 3.0 percent stones*Drainage class:* Well drained*Parent material:* Gravelly colluvium weathered from sandstone and gravelly colluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 6.7 inches**Adel and similar soils***Composition:* 25 percent*Geomorphic description:* Mountain and swale*Slope:* 15 to 35 percent*Elevation:* 5,500 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Loamy alluvium or colluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 10.2 inches**Additional Components**

Bridger and similar soils: 5 percent

Libeg and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

**416C—Bearmouth, moist-Beehive
complex, 2 to 8 percent slopes,
extremely stony****Setting***Elevation:* 5,500 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days**Major Component Description****Bearmouth and similar soils***Composition:* 50 percent*Geomorphic description:* Stream terrace*Slope:* 2 to 8 percent*Elevation:* 5,500 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Very cobbly loam*Rock fragments on the soil surface:* 3 to 15 percent stones, 2 to 3 feet apart*Drainage class:* Well drained*Parent material:* Sandy and gravelly alluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 2.9 inches**Beehive and similar soils***Composition:* 35 percent*Geomorphic description:* Flood plain

Slope: 2 to 8 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly sandy loam
Rock fragments on the soil surface: 3 to 15 percent stones, 2 to 3 feet apart
Drainage class: Somewhat poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Forestland
Flooding: Frequent
Water table: Present
Available water capacity: Mainly 2.6 inches

Additional Components

Novary and similar soils: 8 percent
 Libeg and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

417B—Melville cobbly loam, 0 to 4 percent slopes

Setting

Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Melville and similar soils
Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Forestland
Available water capacity: Mainly 9.0 inches

Additional Components

Redchief and similar soils: 8 percent
 Bridger and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

418D—Melville cobbly loam, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Melville and similar soils
Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 4 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Gravelly glaciofluvial deposits
Native plant cover type: Forestland
Available water capacity: Mainly 9.0 inches

Additional Components

Redchief and similar soils: 8 percent
 Bridger and similar soils: 7 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

419E—Winspect-Work-Bowery, 8 to 35 percent slopes, extremely bouldery

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Winspect and similar soils
Composition: 35 percent
Geomorphic description:

- Nose slope summit on moraine
- Nose slope shoulder on moraine

Slope: 8 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Cobbly loam

Rock fragments on the soil surface: 3 to 15 percent boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Gravelly glaciofluvial deposits weathered from limestone and sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 6.5 inches

Work and similar soils

Composition: 35 percent

Geomorphic description:

- Base slope toeslope on moraine
- Base slope footslope on moraine

Slope: 8 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Gravelly loam

Rock fragments on the soil surface: 3 to 15 percent boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.3 inches

Bowery and similar soils

Composition: 20 percent

Geomorphic description: Moraine and swale

Slope: 8 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.6 inches

Additional Components

Farnuf and similar soils: 5 percent

Work and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

420E—Tibson, extremely bouldery-Bridger, extremely bouldery-Adel complex, 8 to 35 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Bridger and similar soils

Composition: 39 percent

Geomorphic description: Base slope footslope on moraine

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Cobbly clay loam

Rock fragments on the soil surface: 3 to 15 percent boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Silty and clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 7.7 inches

Tibson and similar soils

Composition: 35 percent

Geomorphic description:

- Nose slope summit on moraine
- Nose slope shoulder on moraine
- Side slope shoulder on moraine

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Gravelly loam

Rock fragments on the soil surface: 3 to 15 percent boulders, 3 to 20 feet apart

Drainage class: Well drained

Parent material: Gravelly till, unspecified

Native plant cover type: Rangeland

Available water capacity: Mainly 5.1 inches

Adel and similar soils*Composition:* 20 percent*Geomorphic description:* Moraine and swale*Slope:* 8 to 35 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Loamy alluvium or colluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 10.2 inches**Additional Components**

Whitore and similar soils: 6 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

421E—Sawicki, extremely bouldery-Bowery complex, 4 to 25 percent slopes**Setting***Field investigation intensity:* Order 2*Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days**Major Component Description****Sawicki and similar soils***Composition:* 50 percent*Geomorphic description:*

- Side slope footslope on hill
- Side slope backslope on hill

Slope: 4 to 25 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Very gravelly loam*Rock fragments on the soil surface:* 3 to 15 percent boulders, 3 to 20 feet apart*Drainage class:* Well drained*Parent material:* Gravelly till*Native plant cover type:* Rangeland*Available water capacity:* Mainly 4.2 inches**Bowery and similar soils***Composition:* 40 percent*Geomorphic description:* Hill and swale*Slope:* 4 to 15 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Loamy alluvium or colluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 10.6 inches**Additional Components**

Laceycreek and similar soils: 5 percent

Perma and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

422C—Work, stony-Bowery complex, 2 to 8 percent slopes**Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days**Major Component Description****Work and similar soils***Composition:* 72 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Stony loam*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones, 27 to 67 feet apart*Drainage class:* Well drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 8.3 inches**Bowery and similar soils***Composition:* 20 percent*Geomorphic description:* Fan*Slope:* 2 to 8 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Loam*Drainage class:* Well drained*Parent material:* Loamy alluvium or colluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 10.6 inches

Additional Components

Farnuf and similar soils: 3 percent
Winspect and similar soils: 3 percent
Danvers and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

422E—Work, very stony-Bowery complex, 8 to 35 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Work and similar soils

Composition: 65 percent
Geomorphic description: Fan
Slope: 8 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Gravelly loam
Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 8.3 inches

Bowery and similar soils

Composition: 25 percent
Geomorphic description: Fan
Slope: 8 to 35 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.6 inches

Additional Components

Farnuf and similar soils: 3 percent
Winspect and similar soils: 3 percent
Danvers and similar soils: 2 percent
Wayden and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

424C—Bridger, very stony-Adel complex, 2 to 8 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Bridger and similar soils

Composition: 70 percent
Geomorphic description: Mountainbase on mountain
Slope: 2 to 8 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Stony loam
Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart
Drainage class: Well drained
Parent material: Silty and clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.9 inches
Note: This soil exists on the lower one third of the landform.

Adel and similar soils

Composition: 20 percent
Geomorphic description:

- Mountainbase on mountain
- Swale

Slope: 2 to 8 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.2 inches

Additional Components

Redchief and similar soils: 4 percent
Note: This soil exists on the middle one third of the landform.
Cheadle and similar soils: 2 percent
Note: This soil exists on the upper one third of the landform.

Millerlake and similar soils: 2 percent

Note: This soil exists on the lower one third of the landform.

Tibson and similar soils: 2 percent

Note: This soil exists on the middle one third of the landform.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

424E—Bridger, very stony-Adel complex, 8 to 35 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Bridger and similar soils

Composition: 60 percent

Geomorphic description: Mountainbase on mountain

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Stony loam

Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart

Drainage class: Well drained

Parent material: Silty and clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 7.9 inches

Note: This soil exists on the lower one third of the landform.

Adel and similar soils

Composition: 30 percent

Geomorphic description: Mountainbase on mountain and swale

Slope: 8 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 10.2 inches

Additional Components

Millerlake and similar soils: 3 percent

Note: This soil exists on the lower one third of the landform.

Pintlar and similar soils: 3 percent

Cheadle and similar soils: 2 percent

Note: This soil exists on the upper one third of the landform.

Redchief and similar soils: 2 percent

Note: This soil exists on the middle one third of the landform.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

425E—Pintlar-Bridger loams, 4 to 35 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Pintlar and similar soils

Composition: 45 percent

Geomorphic description: Mountainflank on mountain and swale

Slope: 4 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium

Native plant cover type: Forestland

Available water capacity: Mainly 8.3 inches

Bridger and similar soils

Composition: 40 percent

Geomorphic description: Mountainflank backslope on mountain

Slope: 4 to 35 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Silty and clayey alluvium
Native plant cover type: Forestland
Available water capacity: Mainly 8.2 inches

Additional Components

Adel and similar soils: 5 percent
 Monaberg and similar soils: 5 percent
 Redchief and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

426F—Stemple-Worock complex, 35 to 70 percent slopes, very stony

Setting

Field investigation intensity: Order 2
Elevation: 5,500 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Stemple and similar soils

Composition: 70 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 35 to 70 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very cobbly loam
Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart
Drainage class: Well drained
Parent material: Gravelly colluvium
Native plant cover type: Forestland
Available water capacity: Mainly 4.0 inches

Worock and similar soils

Composition: 15 percent
Geomorphic description:

- Mountainflank backslope on mountain
- Mountainflank footslope on mountain

Slope: 35 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam

Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart

Drainage class: Well drained

Parent material: Gravelly colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 5.8 inches

Additional Components

Danaher and similar soils: 5 percent
 Elve and similar soils: 5 percent
 Timberlin and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

428F—Tibson-Whitore-Rock outcrop complex, 35 to 70 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Tibson and similar soils

Composition: 40 percent
Geomorphic description: Mountainflank backslope on mountain
Slope: 35 to 70 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly till, unspecified
Native plant cover type: Forestland
Available water capacity: Mainly 5.1 inches

Whitore and similar soils

Composition: 35 percent
Geomorphic description: Mountainflank backslope on mountain
Slope: 35 to 60 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Gravelly till
Native plant cover type: Forestland
Available water capacity: Mainly 5.0 inches

Rock outcrop*Composition:* 15 percent*Definition:* Rock outcrop consists mainly of areas of exposed hard bedrock.*Geomorphic description:* Mountain**Additional Components**

Whitore and similar soils: 6 percent

Cheadle and similar soils: 4 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

429E—Work-Roy, bouldery-Bigsag family complex, 2 to 35 percent slopes**Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days**Major Component Description****Work and similar soils***Composition:* 42 percent*Geomorphic description:* Landslide*Slope:* 8 to 35 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Stony clay loam*Drainage class:* Well drained*Parent material:* Clayey colluvium weathered from sandstone and shale*Native plant cover type:* Rangeland*Available water capacity:* Mainly 8.3 inches**Roy and similar soils***Composition:* 30 percent*Geomorphic description:* Landslide*Slope:* 8 to 35 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Very stony clay loam*Rock fragments on the soil surface:* 0.01 to 0.10 percent boulders, 67 to 133 feet apart*Drainage class:* Well drained*Parent material:* Clayey colluvium weathered from sandstone and shale*Native plant cover type:* Rangeland*Available water capacity:* Mainly 4.7 inches**Bigsag and similar soils***Composition:* 15 percent*Geomorphic description:* Pothole on landslide and swale on landslide*Slope:* 2 to 4 percent*Elevation:* 5,300 to 6,200 feet*Effective annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days*Surface layer texture:* Clay*Drainage class:* Very poorly drained*Parent material:* Clayey colluvium weathered from sandstone and shale*Native plant cover type:* Rangeland*Water table:* Present*Ponding duration:* Long*Salt affected:* Saline within 30 inches*Available water capacity:* Mainly 7.8 inches**Additional Components**

Bowery and similar soils: 4 percent

Perma and similar soils: 3 percent

Shambo and similar soils: 3 percent

Winspect and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

430E—Mowbray-Bridger-Novary complex, 0 to 35 percent slopes**Setting***Elevation:* 6,000 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days**Major Component Description****Mowbray and similar soils***Composition:* 35 percent*Geomorphic description:* Landslide*Slope:* 15 to 35 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Channery loam*Drainage class:* Well drained*Parent material:* Gravelly colluvium weathered from calcareous sandstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 4.7 inches

Bridger and similar soils*Composition:* 30 percent*Geomorphic description:* Landslide*Slope:* 4 to 35 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Stony clay loam*Drainage class:* Well drained*Parent material:* Silty and clayey alluvium*Native plant cover type:* Rangeland*Available water capacity:* Mainly 7.7 inches**Novary and similar soils***Composition:* 20 percent*Geomorphic description:*

- Pothole on landslide
- Swale on landslide

Slope: 0 to 6 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Loam*Drainage class:* Poorly drained*Parent material:* Loamy alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Present*Available water capacity:* Mainly 9.5 inches**Additional Components**

Adel and similar soils: 5 percent

Libeg and similar soils: 5 percent

Mowbray and similar soils: 3 percent

Tibson and similar soils: 2 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

431C—Bearmouth-Tiban-Beehive complex, 0 to 8 percent slopes**Setting***Elevation:* 6,000 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days**Major Component Description****Bearmouth and similar soils***Composition:* 35 percent*Geomorphic description:* Stream terrace*Slope:* 0 to 4 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly sandy loam*Drainage class:* Well drained*Parent material:* Sandy and gravelly alluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 3.6 inches**Tiban and similar soils***Composition:* 30 percent*Geomorphic description:* Stream terrace*Slope:* 0 to 8 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly loam*Drainage class:* Well drained*Parent material:* Gravelly colluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 6.2 inches**Beehive and similar soils***Composition:* 25 percent*Geomorphic description:* Flood plain*Slope:* 0 to 4 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly sandy loam*Drainage class:* Somewhat poorly drained*Parent material:* Sandy and gravelly alluvium*Native plant cover type:* Forestland*Flooding:* Frequent*Water table:* Present*Available water capacity:* Mainly 2.6 inches**Additional Components**

Libeg and similar soils: 5 percent

Novary and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

432E—Wayden-Amherst-Winifred complex, 8 to 45 percent slopes**Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days

Major Component Description

Wayden and similar soils

Composition: 35 percent

Geomorphic description:

- Side slope shoulder on hill
- Nose slope shoulder on hill
- Nose slope summit on hill

Slope: 8 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from shale and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Amherst and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope shoulder on hill
- Nose slope summit on hill

Slope: 8 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Gravelly clay loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from andesite

Native plant cover type: Forestland

Available water capacity: Mainly 2.5 inches

Winifred and similar soils

Composition: 25 percent

Geomorphic description:

- Side slope backslope on hill
- Base slope footslope on hill
- Base slope backslope on hill

Slope: 8 to 45 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Cobbly clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 5.3 inches

Additional Components

Bowery and similar soils: 4 percent

Bacbuster and similar soils: 3 percent

Work and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

433D—Monaberg loam, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Monaberg and similar soils

Composition: 85 percent

Geomorphic description: Fan

Slope: 4 to 15 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 9.9 inches

Additional Components

Adel and similar soils: 5 percent

Bridger and similar soils: 5 percent

Millerlake and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

434F—Redchief-Arrowpeak, moist complex, 15 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Redchief and similar soils

Composition: 50 percent
Geomorphic description: Mountainbase on mountain
Slope: 15 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Stony loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.8 inches
Note: This soil exists on the middle one third of the landform.

Arrowpeak and similar soils

Composition: 35 percent
Geomorphic description: Mountainbase on mountain
Slope: 25 to 60 percent
Elevation: 5,500 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residium weathered from gabbro
Native plant cover type: Forestland
Available water capacity: Mainly 1.3 inches
Note: This soil exists on the upper one third of the landform.

Additional Components

Bridger and similar soils: 7 percent
Note: This soil exists on the lower one third of the landform.
 Cheadle and similar soils: 5 percent
Note: This soil exists on the upper one third of the landform.
 Adel and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

435C—Bridger clay loam, 2 to 8 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Bridger and similar soils

Composition: 85 percent
Geomorphic description: Fan
Slope: 2 to 8 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Silty and clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.9 inches

Additional Components

Adel and similar soils: 5 percent
 Libeg and similar soils: 5 percent
 Millerlake and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

436D—Bowery loam, 2 to 15 percent slopes

Setting

Elevation: 5,300 to 6,200 feet
Mean annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days

Major Component Description

Bowery and similar soils

Composition: 85 percent
Geomorphic description: Fan and swale
Slope: 2 to 15 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium or colluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 10.6 inches

Additional Components

Work and similar soils: 7 percent
 Farnuf and similar soils: 5 percent
 Shawmut and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

437E—Cabba-Castner-Work complex, 4 to 35 percent slopes, bouldery

Setting

Field investigation intensity: Order 2

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Cabba and similar soils

Composition: 40 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope backslope on hill
- Side slope backslope on hill

Slope: 4 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Very stony loam

Rock fragments on the soil surface: 0.01 to 0.10 percent boulders, 67 to 133 feet apart

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.3 inches

Castner and similar soils

Composition: 30 percent

Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Bouldery loam

Rock fragments on the soil surface: 0.01 to 0.10 percent boulders, 67 to 133 feet apart

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Residuum weathered from sandstone

Native plant cover type: Rangeland

Available water capacity: Mainly 1.5 inches

Work and similar soils

Composition: 20 percent

Geomorphic description:

- Base slope footslope on hill
- Base slope toeslope on hill

Slope: 4 to 35 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Stony loam

Rock fragments on the soil surface: 0.01 to 0.10 percent boulders, 67 to 133 feet apart

Drainage class: Well drained

Parent material: Clayey alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 8.3 inches

Additional Components

Wayden and similar soils: 5 percent

Farnuf and similar soils: 3 percent

Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

438F—Wayden-Castner complex, 15 to 60 percent slopes, bouldery

Setting

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Major Component Description

Wayden and similar soils

Composition: 50 percent

Geomorphic description:

- Nose slope summit on escarpment
- Side slope shoulder on escarpment
- Nose slope shoulder on escarpment

Slope: 15 to 60 percent

Elevation: 5,300 to 6,200 feet

Effective annual precipitation: 17 to 20 inches

Frost-free period: 70 to 90 days

Surface layer texture: Clay loam

Rock fragments on the soil surface: 0.01 to 0.10 percent boulders, 67 to 133 feet apart

Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from shale and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 2.8 inches

Castner and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on escarpment
- Nose slope shoulder on escarpment

Slope: 35 to 60 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Bouldery loam
Rock fragments on the soil surface: 0.01 to 0.10 percent boulders, 67 to 133 feet apart
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.5 inches

Additional Components

Cabba and similar soils: 3 percent
 Winifred and similar soils: 3 percent
 Amor and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

439B—Fairway-Korchea loams, channeled, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Fairway and similar soils

Composition: 45 percent
Geomorphic description: Flood plain
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam

Drainage class: Somewhat poorly drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Present
Available water capacity: Mainly 9.1 inches

Korchea and similar soils

Composition: 40 percent
Geomorphic description: Flood-plain step
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 10.1 inches

Additional Components

Havre and similar soils: 5 percent
 Kremlin and similar soils: 4 percent
 Yamacall and similar soils: 3 percent
 Richey and similar soils: 2 percent
 Larry and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

440C—Marmarth-Rentsac complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Marmarth and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland
Available water capacity: Mainly 5.6 inches

Rentsac and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Tanna and similar soils: 4 percent
 Cabbart and similar soils: 3 percent
 Evanston and similar soils: 2 percent
 Twilight and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

440D—Marmarth-Rentsac complex, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Marmarth and similar soils

Composition: 50 percent
Geomorphic description:

- Base slope backslope on hill
- Side slope backslope on hill
- Base slope footslope on hill

Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland
Available water capacity: Mainly 5.6 inches

Rentsac and similar soils

Composition: 40 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill

Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Additional Components

Tanna and similar soils: 4 percent
 Cabbart and similar soils: 3 percent
 Evanston and similar soils: 2 percent
 Rock outcrop: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

441D—Yawdim-Delpoint complex, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Yawdim and similar soils

Composition: 50 percent
Geomorphic description:

- Nose slope summit on hill
- Nose slope shoulder on hill
- Side slope shoulder on hill

Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay
Depth to bedrock (paralithic): 10 to 20 inches
Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.4 inches

Delpoint and similar soils

Composition: 40 percent

Geomorphic description:

- Side slope backslope on hill
- Base slope footslope on hill
- Base slope backslope on hill

Slope: 2 to 15 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 4.6 inches

Additional Components

Megonot and similar soils: 4 percent

Cabbart and similar soils: 3 percent

Yamacall and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

442C—Tanna-Yawdim complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Tanna and similar soils

Composition: 50 percent

Geomorphic description: Plain and swale

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay loam

Depth to bedrock (paralithic): 20 to 40 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from sandstone and shale

Native plant cover type: Rangeland

Available water capacity: Mainly 4.2 inches

Yawdim and similar soils

Composition: 40 percent

Geomorphic description: Knoll and plain

Slope: 2 to 8 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Clay

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Clayey residuum weathered from calcareous shale

Native plant cover type: Rangeland

Available water capacity: Mainly 2.4 inches

Additional Components

Marmarth and similar soils: 4 percent

Cabbart and similar soils: 3 percent

Megonot and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

443B—Sieben-Attewan gravelly loams, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Major Component Description

Sieben and similar soils

Composition: 50 percent

Geomorphic description: Tread on terrace

Slope: 2 to 4 percent

Elevation: 3,750 to 5,200 feet

Effective annual precipitation: 10 to 14 inches

Frost-free period: 95 to 125 days

Surface layer texture: Gravelly loam

Drainage class: Well drained

Parent material: Gravelly alluvium

Native plant cover type: Rangeland

Available water capacity: Mainly 3.9 inches

Attewan and similar soils

Composition: 40 percent

Geomorphic description: Tread on terrace

Slope: 0 to 4 percent

Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Additional Components

Verson and similar soils: 4 percent
 Evanston and similar soils: 3 percent
 Sixbeacon and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

444C—Boxwell-Ethridge complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Boxwell and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Ethridge and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained

Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Additional Components

Evanston and similar soils: 3 percent
 Tanna and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Rentsac and similar soils: 1 percent
 Yamacall and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

444D—Boxwell-Ethridge complex, 8 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Boxwell and similar soils

Composition: 45 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum weathered from sandstone and siltstone
Native plant cover type: Rangeland
Available water capacity: Mainly 5.0 inches

Ethridge and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 8 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Drainage class: Well drained
Parent material: Clayey alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.7 inches

Additional Components

Evanston and similar soils: 3 percent
 Greybear and similar soils: 3 percent
 Tanna and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Marmarth and similar soils: 2 percent
 Rentsac and similar soils: 1 percent
 Yamacall and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

445C—Evanston-Tanna complex, 2 to 8 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Evanston and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 9.9 inches

Tanna and similar soils

Composition: 40 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Clay loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Clayey residuum weathered from sandstone and shale
Native plant cover type: Rangeland
Available water capacity: Mainly 4.2 inches

Additional Components

Ethridge and similar soils: 3 percent
 Marmarth and similar soils: 3 percent
 Cabbart and similar soils: 2 percent
 Hinterland and similar soils: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

446B—Beaverell very cobbly loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Beaverell and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very cobbly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 2.5 inches

Additional Components

Attewan and similar soils: 5 percent
 Radersburg and similar soils: 5 percent
 Verson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

447B—Frenchcreek very gravelly loam, 2 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Frenchcreek and similar soils

Composition: 85 percent
Geomorphic description: Tread on stream terrace
Slope: 2 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Very gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 2.9 inches

Additional Components

Attewan and similar soils: 5 percent
 Sieben and similar soils: 5 percent
 Sixbeacon and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

448B—Attewan loam, 0 to 4 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Attewan and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 0 to 4 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Loam
Drainage class: Well drained
Parent material: Loamy over sandy and gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Additional Components

Evanston and similar soils: 5 percent
 Radersburg and similar soils: 5 percent
 Verson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

449E—Redchief very stony loam, 15 to 35 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Redchief and similar soils

Composition: 85 percent
Geomorphic description: Tread on terrace
Slope: 15 to 35 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very stony loam
Rock fragments on the soil surface: 0.1 to 3.0 percent stones, 3 to 27 feet apart
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 5.4 inches

Additional Components

Libeg and similar soils: 5 percent
 Melville and similar soils: 5 percent
 Millerlake and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

450D—Sieben gravelly loam, 2 to 15 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Sieben and similar soils

Composition: 85 percent
Geomorphic description: Fan

Slope: 2 to 15 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 3.9 inches

Additional Components

Radersburg and similar soils: 5 percent
 Sixbeacon and similar soils: 5 percent
 Verson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

451F—Rentsac-Radersburg complex, 15 to 60 percent slopes

Setting

Elevation: 3,750 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days

Major Component Description

Rentsac and similar soils

Composition: 50 percent
Geomorphic description: Side slope backslope on escarpment
Slope: 15 to 60 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Channery loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residium weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.4 inches

Radersburg and similar soils

Composition: 40 percent
Geomorphic description: Base slope on escarpment and fan
Slope: 15 to 60 percent
Elevation: 3,750 to 5,200 feet
Effective annual precipitation: 10 to 14 inches
Frost-free period: 95 to 125 days
Surface layer texture: Cobbly loam

Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 7.4 inches

Additional Components

Sixbeacon and similar soils: 3 percent
 Yawdim and similar soils: 3 percent
 Ethridge and similar soils: 2 percent
 Rock outcrop: 2 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

452D—Redchief-Melville complex, 4 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Redchief and similar soils

Composition: 50 percent
Geomorphic description: Outwash plain
Slope: 4 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Very cobbly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Rangeland
Available water capacity: Mainly 4.7 inches

Melville and similar soils

Composition: 40 percent
Geomorphic description: Outwash plain
Slope: 4 to 15 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Cobbly loam
Drainage class: Well drained
Parent material: Gravelly alluvium
Native plant cover type: Forestland
Available water capacity: Mainly 9.0 inches

Additional Components

Adel and similar soils: 5 percent
 Libeg and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

453D—Libeg very cobbly sandy loam, 2 to 15 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Libeg and similar soils

Composition: 85 percent

Geomorphic description:

- Mountainbase footslope on mountain
- Mountainbase backslope on mountain
- Mountainflank backslope on mountain

Slope: 2 to 15 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very cobbly sandy loam

Rock fragments on the soil surface: 0.01 to 0.10 percent stones, 27 to 67 feet apart

Drainage class: Well drained

Parent material: Gravelly till

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Adel and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Redchief and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

453E—Libeg very cobbly sandy loam, 15 to 35 percent slopes

Setting

Elevation: 6,000 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Libeg and similar soils

Composition: 85 percent

Geomorphic description:

- Mountainbase backslope on mountain
- Mountainbase footslope on mountain
- Mountainflank backslope on mountain

Slope: 15 to 35 percent

Elevation: 6,000 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very cobbly sandy loam

Rock fragments on the soil surface: 0.01 to 0.10 percent stones, 27 to 67 feet apart

Drainage class: Well drained

Parent material: Gravelly till

Native plant cover type: Rangeland

Available water capacity: Mainly 3.8 inches

Additional Components

Adel and similar soils: 5 percent

Monaberg and similar soils: 5 percent

Redchief and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

454F—Redfern-Warwood complex, 25 to 70 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Redfern and similar soils

Composition: 65 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank backslope on mountain

Slope: 15 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 2.1 inches

Warwood and similar soils

Composition: 25 percent

Geomorphic description: Mountainbase footslope on mountain

Slope: 35 to 45 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Drainage class: Well drained

Parent material: Loamy alluvium or colluvium

Native plant cover type: Forestland

Available water capacity: Mainly 9.3 inches

Additional Components

Cheadle and similar soils: 5 percent

Fifer and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

455F—Redfern-Fifer complex, 25 to 60 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Redfern and similar soils

Composition: 65 percent

Geomorphic description:

- Mountainflank backslope on mountain
- Mountaintop shoulder on mountain
- Mountaintop summit on mountain

Slope: 25 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very channery loam

Depth to bedrock (lithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Forestland

Available water capacity: Mainly 2.1 inches

Fifer and similar soils

Composition: 25 percent

Geomorphic description:

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 25 to 60 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Loam

Depth to bedrock (paralithic): 10 to 20 inches

Drainage class: Well drained

Parent material: Loamy residuum weathered from sandstone and siltstone

Native plant cover type: Rangeland

Available water capacity: Mainly 2.7 inches

Additional Components

Cheadle and similar soils: 5 percent

Warwood and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

456F—Stemple-Cheadle, moist, complex, 25 to 70 percent slopes

Setting

Elevation: 5,500 to 7,500 feet

Mean annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Major Component Description

Stemple and similar soils

Composition: 70 percent

Geomorphic description:

- Mountainflank footslope on mountain
- Mountainflank backslope on mountain

Slope: 25 to 70 percent

Elevation: 5,500 to 7,500 feet

Effective annual precipitation: 20 to 25 inches

Frost-free period: 50 to 70 days

Surface layer texture: Very cobbly loam

Drainage class: Well drained

Parent material: Gravelly till

Native plant cover type: Forestland

Available water capacity: Mainly 4.0 inches

Cheadle and similar soils*Composition:* 20 percent*Geomorphic description:*

- Mountaintop shoulder on mountain
- Mountaintop summit on mountain

Slope: 25 to 70 percent*Elevation:* 5,500 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Channery loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from sandstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 1.1 inches**Additional Components**

Timberlin and similar soils: 4 percent

Elve and similar soils: 3 percent

Worock and similar soils: 3 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

457D—Arrowpeak-Gilispie-Fifer complex, 2 to 15 percent slopes**Setting***Elevation:* 6,000 to 7,500 feet*Mean annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days**Major Component Description****Arrowpeak and similar soils***Composition:* 35 percent*Geomorphic description:*

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 2 to 15 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Very channery loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Residuum weathered from gabbro*Native plant cover type:* Rangeland*Available water capacity:* Mainly 1.3 inches**Gilispie and similar soils***Composition:* 30 percent*Geomorphic description:*

- Mountainflank shoulder on mountain
- Mountaintop summit on mountain
- Mountaintop shoulder on mountain
- Mountainflank backslope on mountain

Slope: 2 to 15 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly loam*Depth to bedrock (lithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Clayey residuum weathered from sandstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 2.0 inches**Fifer and similar soils***Composition:* 25 percent*Geomorphic description:*

- Mountaintop summit on mountain
- Mountaintop shoulder on mountain

Slope: 2 to 15 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Loam*Depth to bedrock (paralithic):* 10 to 20 inches*Drainage class:* Well drained*Parent material:* Loamy residuum weathered from sandstone and siltstone*Native plant cover type:* Rangeland*Available water capacity:* Mainly 2.7 inches**Additional Components**

Cheadle and similar soils: 5 percent

Lymanson and similar soils: 5 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

458C—Vebar-Castner complex, 2 to 8 percent slopes**Setting***Elevation:* 5,300 to 6,200 feet*Mean annual precipitation:* 17 to 20 inches*Frost-free period:* 70 to 90 days

Major Component Description

Vebar and similar soils

Composition: 50 percent
Geomorphic description: Plain and swale
Slope: 2 to 8 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Fine sandy loam
Depth to bedrock (paralithic): 20 to 40 inches
Drainage class: Well drained
Parent material: Coarse-loamy alluvium over residuum weathered from calcareous sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 4.3 inches

Castner and similar soils

Composition: 40 percent
Geomorphic description: Knoll and plain
Slope: 2 to 8 percent
Elevation: 5,300 to 6,200 feet
Effective annual precipitation: 17 to 20 inches
Frost-free period: 70 to 90 days
Surface layer texture: Channery sandy loam
Depth to bedrock (lithic): 10 to 20 inches
Drainage class: Well drained
Parent material: Residuum weathered from sandstone
Native plant cover type: Rangeland
Available water capacity: Mainly 1.6 inches

Additional Components

Cabba and similar soils: 3 percent
 Reedwest and similar soils: 3 percent
 Ticell and similar soils: 3 percent
 Absarokee and similar soils: 1 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

459A—Newtman muck, 0 to 2 percent slopes

Setting

Elevation: 3,750 to 6,000 feet
Mean annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days

Major Component Description

Newtman and similar soils

Composition: 92 percent
Geomorphic description: Flood plain
Slope: 0 to 2 percent
Elevation: 3,750 to 6,000 feet
Effective annual precipitation: 10 to 19 inches
Frost-free period: 85 to 125 days
Surface layer texture: Muck
Drainage class: Very poorly drained
Parent material: Alluvium
Native plant cover type: Rangeland
Water table: Present
Ponding duration: Long
Available water capacity: Mainly 6.6 inches

Additional Components

Swampcreek and similar soils: 8 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

460B—Foolhen-Beehive-Bearmouth complex, 0 to 4 percent slopes

Setting

Elevation: 6,000 to 7,500 feet
Mean annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days

Major Component Description

Foolhen and similar soils

Composition: 40 percent
Geomorphic description: Depression and flood plain
Slope: 0 to 2 percent
Elevation: 6,000 to 7,500 feet
Effective annual precipitation: 20 to 25 inches
Frost-free period: 50 to 70 days
Surface layer texture: Sandy loam
Drainage class: Very poorly drained
Parent material: Sandy and gravelly alluvium
Native plant cover type: Rangeland
Flooding: Frequent
Water table: Present
Ponding duration: Long
Available water capacity: Mainly 8.0 inches

Beehive and similar soils*Composition:* 30 percent*Geomorphic description:* Flood plain*Slope:* 0 to 4 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly sandy loam*Drainage class:* Somewhat poorly drained*Parent material:* Sandy and gravelly alluvium*Native plant cover type:* Forestland*Flooding:* Frequent*Water table:* Present*Available water capacity:* Mainly 2.6 inches**Bearmouth and similar soils***Composition:* 20 percent*Geomorphic description:* Stream terrace*Slope:* 0 to 4 percent*Elevation:* 6,000 to 7,500 feet*Effective annual precipitation:* 20 to 25 inches*Frost-free period:* 50 to 70 days*Surface layer texture:* Gravelly sandy loam*Drainage class:* Well drained*Parent material:* Sandy and gravelly alluvium*Native plant cover type:* Forestland*Available water capacity:* Mainly 3.6 inches**Additional Components**

Libeg and similar soils: 5 percent

Novary and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

**461B—Soapcreek-Absher family complex,
0 to 4 percent slopes****Setting***Elevation:* 3,750 to 5,200 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days**Major Component Description****Soapcreek and similar soils***Composition:* 45 percent*Geomorphic description:* Flood plain*Slope:* 0 to 2 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay loam*Drainage class:* Somewhat poorly drained*Parent material:* Clayey alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Present*Available water capacity:* Mainly 9.4 inches**Absher and similar soils***Composition:* 40 percent*Geomorphic description:* Stream terrace*Slope:* 0 to 4 percent*Elevation:* 3,750 to 5,200 feet*Effective annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 125 days*Surface layer texture:* Clay*Drainage class:* Somewhat poorly drained*Parent material:* Silty and clayey alluvium*Native plant cover type:* Rangeland*Water table:* Present*Salt affected:* Saline within 30 inches*Sodium affected:* Sodic within 30 inches*Available water capacity:* Mainly 3.8 inches**Additional Components**

Fairway and similar soils: 5 percent

Swampcreek and similar soils: 5 percent

Yamacall and similar soils: 5 percent

Management

For management information about this map unit,
see appropriate sections in Part II of this publication.

DA—Denied access**Setting****Major Component Description****Denied access***Composition:* 100 percent**Management**

For management information about this map unit,
see appropriate sections in Part II of this publication.

M-W—Water, miscellaneous

Setting

Field investigation intensity: Order 2

Major Component Description

Water, miscellaneous

Composition: 100 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

W—Water

Setting

Major Component Description

Water

Composition: 100 percent

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly

defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and

slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Bouldery soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use

of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum

amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels

of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The

deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these;

- (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or
- (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hornfels. A fine-grained metamorphic rock composed of quartz, feldspar, mica, and other minerals, formed by the action of intrusive rock upon sedimentary rock, especially shale.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is

absolutely impervious to air and water all the time.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

- Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
- Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled

by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Naturalized pasture. Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially

drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate.

The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. (See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or

browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are

placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner,

and have similar conservation needs or management requirements for the major land uses in the survey area.

Similarity index. A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy

or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging

between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain,

streambed, or valley floor that were produced during a former stage of erosion or deposition.

Strippcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

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United States
Department of
Agriculture

In cooperation with the
Montana Agricultural
Experiment Station

MT639—Soil Survey of Sweet Grass County Area, Montana

Part II



Natural
Resources
Conservation
Service



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

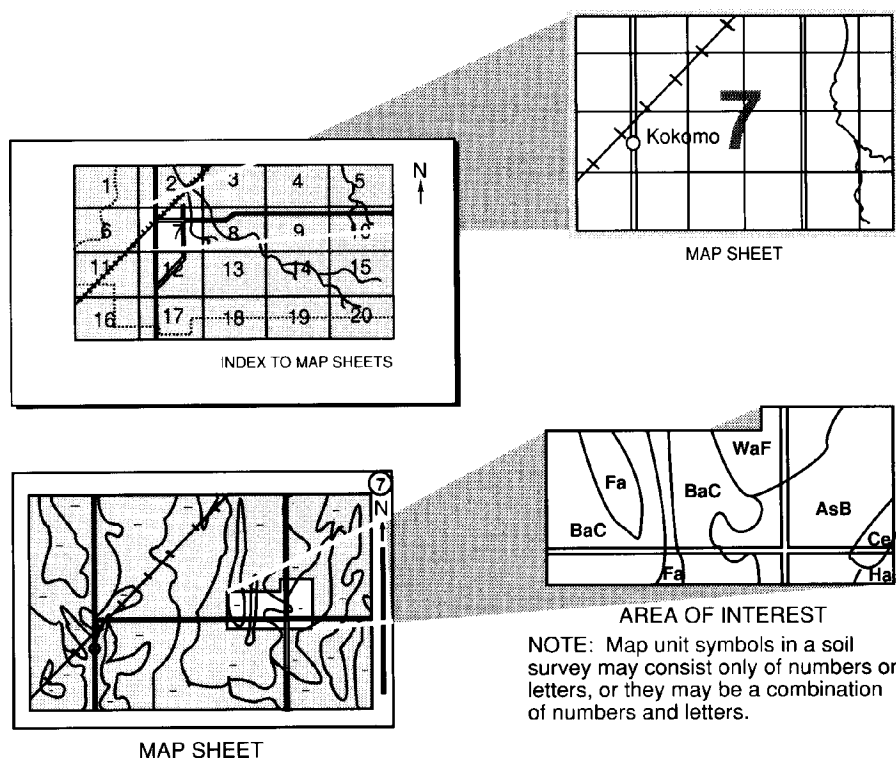
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1997. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Sweet Grass County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Two dominant features of the Sweet Grass County landscape are the Yellowstone River and Crazy Mountains. The river valley soils in this view are mainly Fairway and Korchea loams. Soils that are commonly found in the rangeland are Cabbart loam, Yawdim clay loam, and Reedpoint very channery loams. The high terraces in the background are mostly Roy and Tamaneen cobbly loams. Representative soils in the upper foothills are Adel loam on the rangeland and Stemple very cobbly loam in the forested areas.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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- 454F—Redfern-Warwood complex, 25 to 70 percent slopes

455F—Redfern-Fifer complex, 25 to 60 percent slopes
456F—Stemple-Cheadle, moist, complex, 25 to 70 percent slopes
457D—Arrowpeak-Gilispie-Fifer complex, 2 to 15 percent slopes
458C—Vebar-Castner complex, 2 to 8 percent slopes

459A—Newtman muck, 0 to 2 percent slopes
460B—Foolhen-Beehive-Bearmouth complex, 0 to 4 percent slopes
461B—Soapcreek-Absher family complex, 0 to 4 percent slopes
DA—Denied access
M-W—Water, miscellaneous
W—Water

Summary of Tables

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For tables with the most current data, please visit the
Soil Data Mart at <http://soildatamart.nrcs.usda.gov/>.

Soil Survey of Sweet Grass County Area, Montana

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. In addition, this survey can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. To predict soil behavior, field experience and collected data on soil properties and performance are used.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. This information can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Although soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

"Classification of the Soils" and "Acreage and Proportionate Extent of the Soils" tables at the end of this section show the classification and extent of the soils in this survey area.

Agronomy

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Management

Management concerns affecting the use of the detailed soil map units in the survey area for constructing grassed waterways, vegetating grassed waterways and filter strips, and installing sprinkler irrigation are shown in the table, "Cropland Management."

A *grassed waterway* is a natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. The grassed waterway conducts surface water away from cropland.

A *filter strip* is a trench with a sand or gravel bottom used to filter water.

Sprinkler irrigation is a method to apply water to soils to assist in the production of crops. Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their

limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production

and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in the table, "Land Capability and Yields per Acre of Crops and Pasture." The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Prime Farmland and Other Important Farmland

In this section, prime farmland and other important farmland are defined. The soils in the survey area that are considered prime farmland are listed in the table, "Prime and Important Farmland," at the end of this section.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing

food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pasture, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in the "Prime and Important Farmland" table. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in the "Acreage and Proportionate Extent of the Soils" table. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Additional Farmland of Statewide Importance

Some areas other than areas of prime farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate state agency or

agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states, additional farmland of statewide importance may

include tracts of land that have been designated for agriculture by state law.

Farmland of statewide importance is included in the list of prime farmland. Criteria is available in the Field Office Technical Guide, Section II, which is available in local offices of the Natural Resources Conservation Service and online at <http://www.nrcs.usda.gov/technical/efotg/>.

Rangeland

Range makes up about 75 percent of the land in Sweet Grass County. The areas of range provide forage for about 45,000 cow-calf pairs and 18,400 sheep and lambs. Nearly 88 percent of the farm income in the county is derived from the sale of livestock. The average size of a ranch is about 2,800 acres.

Most grazing is on native range. The range is used primarily for grazing by domestic livestock. However, it also is used as wildlife habitat, recreational areas, and watershed, and it has esthetic value.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Range is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed forestland is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Native pasture is defined as land on which the potential (climax) vegetation is forest but which is used and managed primarily for the production of native forage plants. Native pasture includes cutover forest land and forest land that has been cleared and is managed for native or naturalized forage plants.

The table "Rangeland and Grazeable Understory—Productivity and Characteristic Plant Communities" at the end of this section shows, for each soil, the ecological site; the total annual production of vegetation in favorable, normal, and

unfavorable years; the characteristic native vegetation; and the average percentage of each species. Explanation of the column headings in this table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service and online at <http://www.nrcs.usda.gov/technical/efotg/>.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well-managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic native vegetation—the grasses, forbs, and shrubs that make up most of the potential

natural plant community on each soil—is listed by common name. Under *rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Rangeland Condition

Rangeland condition is based on a comparison of the present plant community with the potential natural plant community on a particular ecological site. The more closely the existing community resembles the natural community, the better the range condition.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed. A very severe disturbance may completely destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weedlike plants, can invade. If the plant community has not deteriorated significantly, it eventually can return to dominantly natural plants if proper grazing management is applied.

Four range condition classes are used to show the degree of deterioration of the natural plant community.

An area of rangeland is in *excellent condition* if more than 75 percent of the present plant community is the same as the natural plant community. It is in *good condition* if the natural plants make up 51 to 75 percent of the present plant community, in *fair condition* if those plants make up 26 to 50 percent, and in *poor condition* if they make up less than 25 percent.

Knowledge of the range site and condition is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, the potential for recreational uses, and the condition of watersheds.

Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend.

Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the “National Range and Pasture Handbook” (USDA, 2003).

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing use, timely deferment of grazing, and planned rotation grazing systems are key practices. The experience of ranchers and research has shown that if no more than one-half of the current year's growth is grazed, a plant community in good or excellent condition can be maintained and one in fair condition can be improved. The remaining one-half enables plants to make and store food for regrowth and root development. As a result, the desirable plants remain healthy and are not replaced by less desirable grasses and weeds. Also, the plant cover protects the soil from water erosion and soil blowing, improves tilth, increases the rate of water infiltration, and helps to control runoff.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These practices include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding. The table, “Rangeland Improvement,” shows, for each map unit, the limitations to the range improvements of fencing and developing pond reservoir areas.

Various kinds of grazing systems can be used in range management. No single grazing system is best under all conditions. The grazing system should increase the quantity and improve the quality of the range vegetation; should meet the needs of the individual operator; and should be designed

according to topography, type of grazing animals, and resource management objectives.

Special improvement practices are needed in areas where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These practices include range seeding, brush management, water spreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for range improvement. On other soils, however, only proper grazing management can improve the range. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical brush and weed control, and water spreading. Those soils in capability classes 7 and 8, however, are not suitable. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification, for seeding and as a means of increasing the rate of water infiltration for seed germination.

Where feasible, mechanical renovation practices, such as shallow chiseling, can help to speed recovery of the desired plants. These practices open up the surface and thus allow absorption of more moisture and production of more desirable plants. Mechanical renovation, brush management, and timely deferment of grazing allow recovery of desired plants.

Seeding may be needed in areas where less desirable plants are dominant. A clean, firm seedbed should be prepared, suitable species should be selected for seeding, and rest periods should be long enough to allow the new plants to become established. Special improvement practices can be

effective only if the management system helps to keep the desirable plants healthy.

Forestland Understory Management

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forestland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Forest understory production can be influenced by controlling canopy density in addition to the management of stocking rates, distribution, and season of use. Often both the forestland and range resources can be enhanced through thinning the overstory to canopy levels that optimize both timber and forage production. Broadcast seeding of disturbed areas soon after timber harvest can improve forage quantity and quality and reduce the chances of undesirable plants occupying the site.

Steepness of slopes and distance to drinking water are severe grazing management problems in much of the mountain and foothill areas. Variations in primary season of use, production levels, and plant communities because of elevation and aspect changes present additional challenges. Long, steep slopes provide limited access to livestock. Less sloping areas are subject to overuse. Grazing should be delayed until the soil is firm enough to withstand trampling and the plants have matured enough to withstand grazing pressure.

Riparian areas should be protected from overuse by livestock. Misuse results in deterioration of protective vegetation, reduction of streambank stability, and excessive erosion. Developing off-stream-watering locations can successfully prevent cattle from overgrazing riparian areas and encourage better livestock distribution.

Forestland

Robert D. Logar, Montana State Forester, Natural Resources Conservation Service, prepared this section.

Forest Resource Statistics

Total acres within the survey area are approximately 900,700 (Alexander, 1966). Approximately 10 percent, or about 88,682 acres, of the survey area is forested (Eyre, 1980). The commercial forestland is generally of low productivity, producing less than 50 cubic feet per acre per year (Dahms, 1964). Net volume of sawtimber within the survey area was estimated in 1989 to be approximately 335,001,000 board feet; 90 percent of which is softwood timber (Meyer, 1938; Dahms, 1964). Eighty-eight percent of the estimated timber volume is on private land (Dahms, 1964). Low productivity and small tree diameters limit the sawtimber volume available. Harvesting of the timber resource has increased over the years. Both sawtimber and pulp wood have been removed. Approximately 351,000 board feet of sawtimber is removed annually on nonindustrial private forestland (Meyer, 1938). Net annual growth of sawtimber is about 9,513,000 board feet. The area has an annual mortality of about 575,000 board feet of sawtimber (Eyre, 1980).

Fire Protection

The forestland within the survey area is protected from fire by the Montana Department of Natural Resources and Conservation, Forestry Division, and local fire districts. The Black Butte Fire occurred in September 1994. The burn was approximately 12,000 acres with about 82 percent on private land. Of those 12,000 acres, about half were forested. About 1,500 acres were of high intensity burn; 4,000 acres were of medium intensity burn; and 6,500 acres were of low intensity burn.

Cover Types

Soils vary in their ability to support the growth of trees. Depth, fertility, texture, and available water

capacity influence tree growth. Elevation, aspect, soils, and climate determine the kinds of trees that can be expected on a site and their growth rate. The forested soils in the soil survey area range from shallow to very deep, from nongravelly to extremely gravelly, and from fine textured to coarse textured. Because of differences among soils, as well as differences in climate, topography, and geology, forests vary in composition and productivity.

In this survey area, ponderosa pine and Douglas-fir cover types occupy the largest acreage. Cover types of limber pine, Rocky Mountain juniper, plains/narrow leaf/black cottonwood, green ash, Engelmann spruce, and quaking aspen occupy lesser acreages.

Parent Material

The forested areas are generally associated with four different parent materials in the survey area:

1. The interbedded sandstone and shale of the Fort Union Formation
2. The agglomerate of the Weeds Formation
3. The alluvium of the Yellowstone and Boulder River valleys
4. The glacial moraines of the Boulder River, and Elk, Big Timber, and Sweetgrass Creeks

Forested Areas

The major part of the coniferous forestland within the survey area can be divided into three general areas:

1. Foothills of the Absaroka-Beartooth Mountains
2. Sweetgrass Hills*
3. Foothills of the Crazy Mountains

*There are forested hills that form the divide between Sweetgrass and White Beaver Creeks. To assist in identifying this area, and though unofficial, this area will be referred to as the Sweetgrass Hills for the purposes of this manuscript.

The foothills of the Absaroka-Beartooth Mountains occur mostly in the southern part of the county. The Sweetgrass Hills occur in the central and northern portions. The foothills of the Crazy Mountains occur in

the northern and western portions. Elevation ranges from about 3,740 feet (Reedpoint) to 7,500 feet (Green Mountain) for the forestland within the survey area.

Foothills of the Absaroka-Beartooth Mountains

The foothills of the Absaroka-Beartooth Mountains are a part of the Weeds Formation and contain some alluvium and glacial moraine deposits. The Weeds Formation is a coarse-grained volcanic mudflow. The soils are primarily steep, shallow to deep, noncalcareous, loamy textured material with some rock outcrop.

Ponderosa pine, Douglas-fir, lodgepole pine, limber pine, and Rocky Mountain juniper cover types occupy the foothills of the Absaroka-Beartooth Mountains. This area is primarily within the 15- to 19-inch precipitation zone with a small area of 20 to 25 inches along the Boulder River and Elk Creek. Forest soils generally associated with the Weeds Formation are the Ashbon, Sweetweed, Vision, and Whitlash soil series. Forest soils generally associated with the glacial moraine deposits are the Rocko, Stemple, and Worock soil series. The associated plant communities are dominated by Idaho fescue, bluebunch wheatgrass, rough fescue, pinegrass, mallow ninebark, common snowberry, and Rocky Mountain juniper.

Quaking aspen is found in random wet areas throughout the survey area, predominantly in the 15- to 19-inch precipitation zone. Quaking aspen occur on the Adel, Bridger, Monaberg, and Pintlar soil series. These soils have moderate to high available water capacity and are located in positions that receive extra moisture. The forest understory plant community is dominated by mountain brome, bearded wheatgrass, Oregon grape, common snowberry, and sticky geranium.

Sweetgrass Hills

The Sweetgrass Hills consist of interbedded sandstone and shale of the Fort Union Formation with alluvium located along the Yellowstone River valley. Where the Fort Union Formation has been uplifted, it has developed primarily into areas of shallow and moderately deep soils with some rock outcrop. The forested areas have varying degrees of stand density occupying these sites.

Ponderosa pine, limber pine, Rocky Mountain juniper, and small areas of Douglas-fir occupy the Sweetgrass Hills. This area is primarily within the 10- to 14-inch precipitation zone. Forest soils generally associated with the Fort Union Formation

and the ponderosa pine/limber pine cover type are the Birney, Cabbart, Delpoint, and Rentsac soil series. The associated forest understory plant community varies with precipitation, steepness of slope, aspect, overstory tree canopy density, and soils. Associated plant communities are dominated by bluebunch wheatgrass, green needlegrass, little bluestem, skunkbush sumac, common snowberry, and juniper.

A Douglas-fir cover type exists primarily on the northern aspects. Forest soils generally associated with this cover type are the Cabba, Castner, and Doney soil series. Associated plant communities are dominated by Idaho fescue, bluebunch wheatgrass, thickspike wheatgrass, and common juniper.

Plains and narrowleaf cottonwood cover types exist along the lower portions of the Yellowstone River (below the confluence of Sweetgrass Creek) and its tributaries. These areas fall within a 10- to 14-inch precipitation zone. Havre, Meadowcreek, and Nesda soil series are some of the associated soils in these valley bottoms. Associated plant communities are dominated by bluebunch wheatgrass, green needlegrass, needleandthread, western wheatgrass, Canada wildrye, and rose. Green ash is associated with the cottonwoods but is generally found along smaller drainageways and occurs on well-drained soils.

Narrowleaf and black cottonwood cover types are found along the upper portions of the Yellowstone River (above the confluence with Sweetgrass Creek) and its tributaries. These areas occur within the 15- to 19-inch precipitation zone. McIlwaine, Meadowcreek, and Nesda are some of the associated soil series found in these valley bottoms. Associated plant communities are dominated by bluebunch wheatgrass, basin wildrye, slender wheatgrass, western wheatgrass, common snowberry, common chokecherry, and rose. Green ash cover type exists in the smaller drainageways and occurs on well-drained soils.

The occasionally flooded soils of the valley bottoms are generally forested with deciduous tree species. The rarely flooded soils of the valley bottoms are occasionally forested with deciduous trees. Trees have been cleared from much of the rarely flooded and some of the occasionally flooded alluvial soil areas for crop production.

Foothills of the Crazy Mountains

The foothills of the Crazy Mountains consist of interbedded sandstone and shale of the Fort Union

Formation with some glacial moraine deposits near Big Timber and Sweetgrass Creeks. Where this formation has been uplifted, it has developed primarily into areas of shallow and moderately deep soils with some rock outcrop. The forested areas have varying degrees of stand density occupying these sites.

The foothills of the Crazy Mountains are occupied by Douglas-fir, limber pine, and Engelmann spruce cover types. This area is primarily within the 15- to 19-inch precipitation zone with some small areas of 20 to 25 inches nearer the mountains. The forest soils associated with the Fort Union Formation in the 15- to 19-inch precipitation zone are the Cabba and Castner soil series. Forest soils associated with the Fort Union Formation in the 20- to 25-inch precipitation zone are the Cowood, Danaher, Redfern, Timberlin, Tongue River, and Warwood soil series. Forest soils associated with the glacial moraine deposits are the Rocko, Stemple, and Worock soil series. The Beehive soil series is associated with the Engelmann spruce cover type. The associated forest understory plant community varies with precipitation, steepness of slope, aspect, overstory tree canopy density, and soils. Associated plant communities are dominated by Idaho fescue, bluebunch wheatgrass, Columbia needlegrass, common juniper, and common snowberry in the lower elevations and elk sedge, rough fescue, pinegrass, grouse whortleberry, and ninebark in the higher elevations.

Quaking aspen is found in random wet areas throughout the survey area, predominantly in the 15- to 19-inch precipitation zone. Adel, Bridger, Monaberg, and Pintlar soil series are the associated soils. These soils have moderate to high available water capacity and are located in positions that receive extra moisture. The forest understory plant community is dominated by mountain brome, bearded wheatgrass, Oregongrape, common snowberry, and sticky geranium.

Forestland Management and Productivity

Soil Interpretations

To aid those who manage forestland in the soil survey area, soil interpretations relating to forestland

use and management have been developed. Items considered for interpretation are:

1. Conservation tree/shrub suitability groups,
2. Construction limitations for haul roads/log landings,
3. Hand planting suitability,
4. Harvest equipment operability,
5. Log landing operability,
6. Mechanical planting suitability,
7. Mechanical site preparation (deep),
8. Mechanical site preparation (surface),
9. Potential erosion hazard (off-road/off trail),
10. Potential erosion hazard (road/trail),
11. Road suitability (natural surface),
12. Soil rutting hazard, and
13. Potential fire damage hazard.

Not all of these forestry interpretations may be expressed. Local work groups who would be using the "Soil Survey Manual" (Soil Survey Division Staff, 1993) selected the interpretations they would like to see as a part of this manuscript.

Forestland management information for each forested soil is contained in the "Forest Harvest Management" table. Definitions, ratings, and assumptions are explained in the following paragraphs

Soil Rating and Limitations

In the "Forest Harvest Management" table the values listed indicate severity of the criteria limitations, with 0.00 being not limited and 1.00 being very limited.

Off-Road Erosion Hazard, Road Erosion Hazard, and Road/Log Landings Construction Limitations are the hazards or risks of soil loss from unsurfaced roads/trails.

1. Ratings assess:

- a. The force that natural precipitation events have to dislodge and move soil materials on roads, trails, and firebreaks.
- b. Activities on roads and trails that result in bare ground, compaction, and reshaping of the soil surface.
- c. Use by trucks, skidders, off-road vehicles, and other similar equipment.
- d. The impact on compacted, bare road, trail surface using the representative value for slope gradient of the soil component.

2. Ratings assume that roads and trails are generally linear, continuous, and narrow and range up to 7.5 meters in width.

3. Ratings do not assess frozen or snow-covered soil.
4. Definition of ratings:
 - a. Not limited: Little or no erosion is likely.
 - b. Limited: Some erosion is likely; occasional maintenance may be needed; simple erosion control measures may be needed.
 - c. Very limited: Significant erosion can be expected; roads require frequent maintenance; costly erosion control measures are needed.
5. Soil rating criteria: Primary soil features considered in making this rating were slope, soil erodibility factor, and percent rock fragments.

Forestland Productivity

Expected tree growth rate and the diversity of trees on a site are determined by a combination of elevation, aspect, soils, and climate. The ability of soils to support tree growth is dependent on variability in soil depth, fertility, texture, and available water capacity.

The “Forestland Productivity” table includes the columns *Common Trees*, *Site Index*, *Volume of Wood Fiber*, and *Trees to Manage*. The column, *Common Trees*, refers to the trees most commonly encountered on the different soils. For the more common trees, particularly those of commercial value, site index values have been determined.

Site Index is a value that ranks soil productivity for a specified tree species. It is determined by taking height measurements and concluding the age of selected trees within stands of a given species (Alexander, 1966). This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The specified number of years (base age) may be different for different species. The site index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in the “Forestland Productivity” table are averages based on measurements made at sites that are representative of the soil series. The higher the site index number is, the more productive the soil for that species is.

The site index base age is 30 years for narrowleaf and plains cottonwood; 50 years for black cottonwood, Douglas-fir, and Engelmann spruce; 80 years for quaking aspen; and 100 years for ponderosa pine and lodgepole pine. Therefore site index values are not directly comparable from one species to another. Site index values were computed from the following references: ponderosa pine (Meyer, 1938), quaking aspen (Baker, 1925),

lodgepole pine (Alexander, 1966), Douglas-fir (Brickell, 1968), black cottonwood (Sauerwein, 1979) and plains cottonwood (locally adapted site index curves developed by the NRCS).

The *Trees to Manage* column in the “Forestland Productivity” table lists trees adapted to the site. The first listed tree species will likely be the most productive.

Yields

The column, *Volume of Wood Fiber*, in the “Forestland Productivity” table lists the average annual yield estimates in board feet (Scribner’s log rule) per acre for selected tree species. Overstory yield estimates were determined for most species from average annual yield versus site index curves developed through adjustment of data presented in yield tables published from several different sources. Average annual yield values were computed at the culmination of mean annual increment.

“Yield of Even-aged Stands of Ponderosa Pine” (Meyer, 1938) was used for estimating the yields of ponderosa pine. “Yield Tables for Managed Stands of Lodgepole Pine in Colorado and Wyoming” (Myers, 1967) was used to estimate the board foot yield of lodgepole pine. Board-foot volumes in the reference are based on Scribner’s log rule and include all trees larger than 10 inches in diameter breast height to an 8-inch top diameter inside bark. Total cubic foot yield estimates are based on “Gross and Net Yield Tables for Lodgepole Pine” (Dahms, 1964). In this reference, total cubic foot volume estimates (inside bark) are based on all trees with diameter breast height inside the bark of more than 1 inch. “Aspen in the Central Rocky Mountain Region” (Baker, 1925) was used to estimate quaking aspen yields. Total cubic-foot volume estimates in the reference are based on all trees larger than 4 inches in diameter breast height. Plains cottonwood yields are based on data collected by the NRCS.

Forest Understory

Forest understory information can be found in the “Rangeland” section of the manuscript with the use of the “Rangeland and Grazeable Understory—Productivity and Characteristic Plant Communities” table. The forest understory information consists of a listing of the understory plant species expected to occur beneath a forest canopy, an estimate of the associated understory production in favorable and unfavorable years, and the habitat type or ecological site description that would best describe the climax plant community.

Recreation

Sweet Grass County Area is located in the south-central portion of Montana. The area has mountains and rangeland and is bordered by Park, Meagher, Wheatland, Golden Valley, Stillwater and Carbon Counties. This area of Montana provides many recreational opportunities. The soils in the Sweet Grass County Area support a wide range of outdoor recreational activities. Common recreational activities include hunting, fishing, hiking, camping, canoeing, rafting, cross-country skiing, snowmobiling, and admiring the beautiful scenery. Knowledge of soil types is a valuable tool for managing areas with recreational potential.

Forest Service-owned land in Sweet Grass County totals 281,835 acres in the Gallatin National Forest. There are many hiking trails and cabins, which hikers and skiers can rent. There are also numerous public campgrounds and picnic areas.

Big Timber, the largest town in Sweet Grass County, is located between the Crazy and Absaroka Mountains on the confluence of the Boulder and Yellowstone Rivers. To the northwest of Big Timber, the Crazy Mountains rise to a height of 11,000 feet. To the south, in the Absaroka Range, is Granite Peak, Montana's highest mountain, which rises to 12,799 feet. These areas of Sweet Grass County provide an abundance of recreational opportunities.

The Boulder and Yellowstone Rivers are noted for some of the best trout fishing in the United States. There are 50 miles of native trout streams on the

Boulder River, located in the Gallatin National Forest. Species available are brook trout, brown trout, native cutthroat trout, and rainbow trout. Besides trout fishing, the Yellowstone River is also popular for canoeing and floating. In addition to the Boulder and Yellowstone Rivers, there are many other smaller streams and lakes that provide backcountry fishing opportunities.

In and near Sweet Grass County are licensed outfitters and guest ranches, which provide pack trips, hunting, fishing, and other recreational opportunities. A wide range of hunting options are available for big game and upland game birds. There are big game guide services available, but also individual permits for whitetail and mule deer, elk, and moose. Antelope are plentiful on the rangeland.

The climate in parts of Sweet Grass County is another attraction for many visitors. Daytime temperatures rarely exceed 90 degrees, and nights are cool. The humidity seldom rises above 25 or 30 percent.

Sweet Grass County lies 75 miles northeast of Yellowstone National Park, one of the largest tourist attractions in the west. Yellowstone National Park has many miles of scenic hiking trails. These same trails provide for outstanding cross-country skiing in the winter. As well as having broad mountain ranges and beautiful valleys, Yellowstone National Park also has many miles of clear mountain streams and rivers that abound with trout.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

Elements of Wildlife Habitat

The following paragraphs describe the elements of wildlife habitat.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are barley, oats, rye, and wheat.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are alfalfa, brome grass, clover, crownvetch, fescue, orchardgrass, reed canarygrass, timothy, and trefoil.

Wild herbaceous plants are native or naturally established forbs and grasses, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are blackberry, blueberry, bluestem, dandelion, fescue, goldenrod, Indiangrass, lambsquarters, nightshade, ragweed, and wheatgrass.

Deciduous trees and woody understory produce bark, buds, catkins, foliage, nuts or other fruit, and twigs. Soil properties and features that affect the growth of deciduous trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of deciduous trees and woody understory are American elm, birch, boxelder, green ash, maple, oak, poplar, and willow. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are American plum, chokecherry, crabapple, hawthorn, honeysuckle, redosier dogwood, serviceberry, and silver buffaloberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are cedar, fir, hemlock, juniper, larch, pine, spruce, and yew.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are big sagebrush, bitterbrush, mountain mahogany, and snowberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are arrowhead, bulrush, cattail, pickerelweed, rushes, sedges, smartweed, water plantain, wild millet, and wildrice.

Shallow-water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples are beaver ponds, muskrat marshes, waterfowl feeding areas, wildlife watering developments, and other wildlife ponds.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, meadows, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to openland areas include cottontail rabbit, field sparrow, Hungarian partridge, killdeer, meadowlark, pheasant, red fox, sage grouse, and sharp-tailed grouse.

Habitat for woodland wildlife consists of areas of coniferous and/or deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to woodland areas include black bear, deer, elk, owl, porcupine, raccoon, ruffed grouse, thrush, tree squirrel, wild turkey, and woodpecker.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow-water areas. Some of the wildlife attracted to wetland areas include beaver, bittern, duck, geese, heron, kingfisher, mink, muskrat, otter, and rail.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland areas include antelope, deer, lark bunting, meadowlark, and sage grouse.

Wildlife of the Sweet Grass County Area

Habitat quality and interspersions determine wildlife population levels. Suitability of a particular habitat for a wildlife species depends greatly on the nature of the plant communities present. Prevailing land-use practices and management determine the quantity, quality, and distribution of plant communities. These

factors are governed to some extent by the soils of the area.

Rating soils for their ability to produce vegetative elements for wildlife habitat does not take into account local climatic influences, present use of soils, juxtaposition of habitat types or elements, or present distribution of wildlife species. For these reasons, the selection and suitability of an area for wildlife habitat development require onsite evaluation.

The Sweet Grass County Area has a diverse landscape that offers a wide range of wildlife habitat. The northeastern portion supports antelope, prairie dogs, sage grouse, hawks, eagles, and other animals that inhabit the open plains.

The creeks, reservoirs, and rivers support brook trout, cutthroat trout, and rainbow trout. Wetlands near and around these water bodies provide resting and feeding areas for migratory waterfowl in the spring and fall.

Cultivated areas provide food and cover for grouse, partridge, pheasant, and many types of song birds. Foothill and mountain areas support black and grizzly bear, elk, moose, mountain lion, grouse, and squirrel. Mule deer and white-tailed deer roam throughout the county in a variety of wildlife habitats.

Populations of game and nongame species can be enhanced by using conservation practices to improve their habitat. These practices include development of odd or irregularly shaped areas in and adjacent to farmland to provide food and cover, protection of habitat from fire or grazing, and establishment of woody vegetation to provide winter shelter. Wildlife habitat may also be enhanced through application of commonly employed conservation practices including minimum tillage, planned grazing systems, pond construction, shelterbelts and field windbreaks, and stripcropping.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The "Building Site Development" table shows the degree and kind of soil limitations that affect dwellings with and without basements.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair

performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Sanitary Facilities

The "Building Site Development" table shows the degree and kind of soil limitations that affect septic tank absorption fields. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance

and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Construction Materials

The "Construction Material Potential" table gives information about the soils as potential sources of gravel, roadfill, sand, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the "Construction Material Potential" table, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has

been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

In the table, the types of potential sources that each soil was evaluated for are listed under the *probability* column. The *value* column assigns a rating to each soil as to its potential as a source for the materials listed. The ratings range from 0 to 100. They indicate gradations between the point at which a soil feature is severely limited (0) to the point at which the soil has the greatest probability (100) of being a potential source of the construction material.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

The "Engineering Index Properties" table gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association

of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the

survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

The "Physical Properties of the Soils" table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk

density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the

“Physical Properties of the Soils” table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

The “Chemical Properties of the Soils” table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less

than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

The "Water Features" table gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redox features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

The "Soil Features" table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both

of which significantly affect the ease of excavation.

Depth to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density.

Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly

defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and

slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Bouldery soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use

of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum

amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels

of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The

deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these;

- (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hornfels. A fine-grained metamorphic rock composed of quartz, feldspar, mica, and other minerals, formed by the action of intrusive rock upon sedimentary rock, especially shale.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is

absolutely impervious to air and water all the time.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled

by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Naturalized pasture. Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially

drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate.

The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. (See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or

browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are

placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner,

and have similar conservation needs or management requirements for the major land uses in the survey area.

Similarity index. A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy

or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging

between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain,

streambed, or valley floor that were produced during a former stage of erosion or deposition.

Strippcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

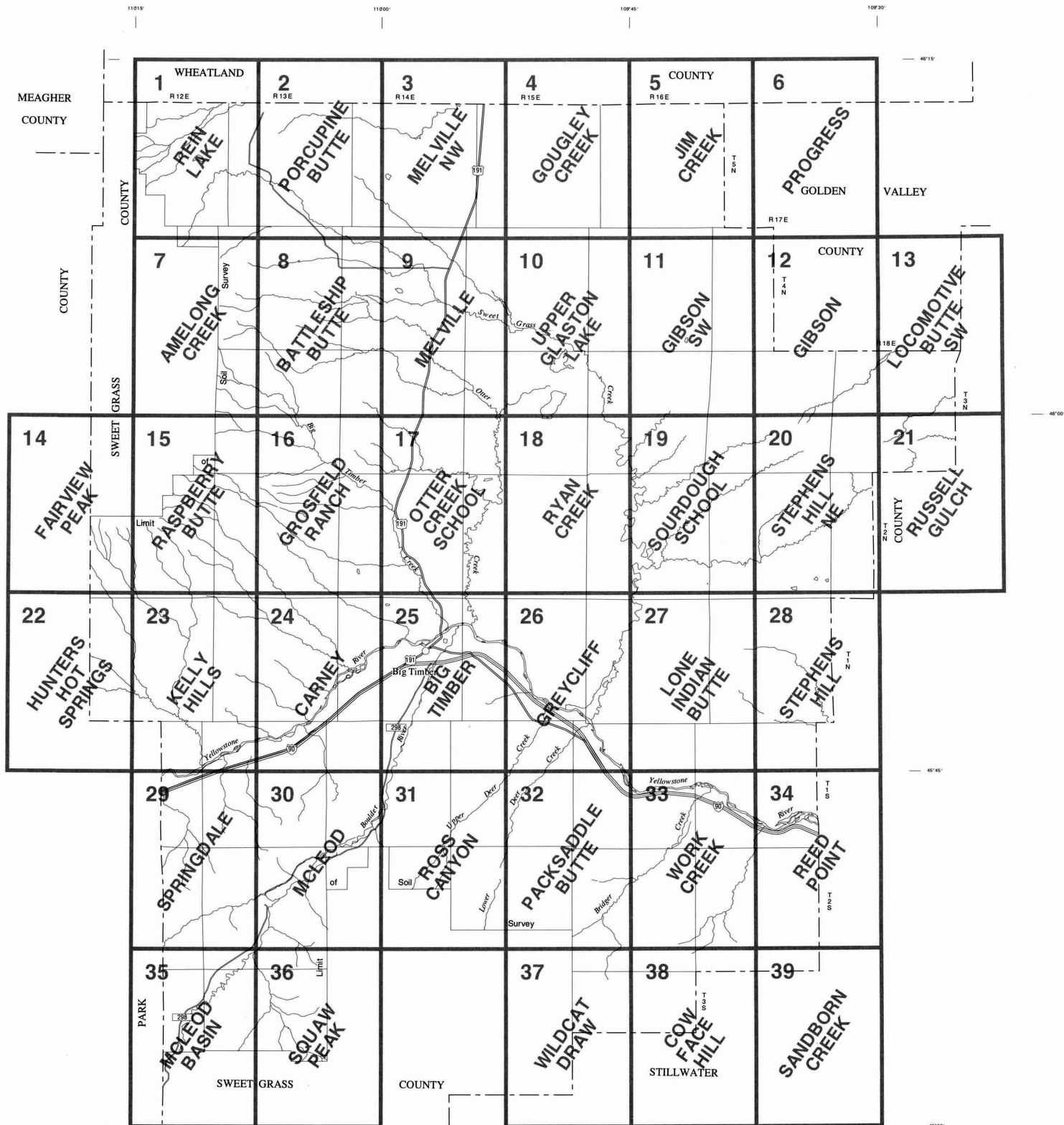
Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

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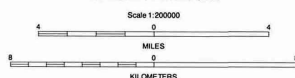
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SECTIONALIZED
TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS SWEET GRASS COUNTY AREA, MONTANA



Zoom to full extent to view
Section, Township, Range.

SOIL LEGEND

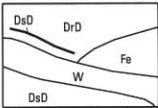
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
100B	Nesda-Meadowcreek-Clunton loams, 0 to 4 percent slopes	191C	Castner-Farnuf complex, 2 to 8 percent slopes	279C	Shambo clay loam, calcareous, 4 to 8 percent slopes	384E	Fifer-Cheadle complex, 15 to 45 percent slopes
102B	Ledger family, clay loam, 1 to 4 percent slopes	192D	Castner-Shambo complex, 8 to 15 percent slopes	281F	Shawmut-Castner complex, 15 to 60 percent slopes	385E	Millerlake-Arrowpeak-Adel complex, 8 to 35 percent slopes
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104A	Meadowcreek loam, 0 to 2 percent slopes	194C	Linwell-Amor complex, 2 to 8 percent slopes	283F	Castner-Wayden complex, moist, 15 to 60 percent slopes	387E	Tongue River-Novary-Cowood complex, 4 to 45 percent slopes
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107A	Nesda-McIlwaine loams, 0 to 2 percent slopes	197C	Work-Castner complex, 2 to 8 percent slopes	284D	Shawmut gravelly loam, 8 to 15 percent slopes	391F	Tongue River-Timberlin complex, 35 to 60 percent slopes
109A	Meadowcreek-Nesda loams, 0 to 2 percent slopes	197D	Work-Castner complex, 8 to 15 percent slopes	286F	Wayden-Rock outcrop complex, 15 to 60 percent slopes	392E	Doney-Vershal complex, 8 to 35 percent slopes
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112C	Cabbart-Delpoint, calcareous, loams, 2 to 8 percent slopes	202D	Castner-Absarokee complex, 8 to 15 percent slopes	290C	Breeton loam, 2 to 8 percent slopes	395E	Whitlash-Beenom-Bacbuster complex, 8 to 25 percent slopes
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112E	Cabbart-Delpoint, calcareous loams, 15 to 35 percent slopes	204A	Dimmick silty clay, 0 to 2 percent slopes	294B	Roy gravelly loam, 0 to 4 percent slopes	397E	Castner-Lacey creek-Bowery complex, 8 to 25 percent slopes
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117C	Cabbart-Tanna complex, 2 to 8 percent slopes	209C	Fairfield gravelly loam, 2 to 8 percent slopes	303D	Winspect cobbly loam, 4 to 15 percent slopes	399F	Reedwest-Cabba-Castner complex, 15 to 60 percent slopes
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144D	Evanston loam, 8 to 15 percent slopes	229D	Absarokee-Cabba loams, 8 to 15 percent slopes	343F	Ashbon-Winkler-Rock outcrop complex, 35 to 60 percent slopes	419E	Winspect-Work-Bowery, 8 to 35 percent slopes, extremely bouldery
145C	Boxwell, calcareous-Cabbart loams, 2 to 8 percent slopes	230B	Farnuf loam, 0 to 4 percent slopes	344F	Vision-Sweetweed-Whitlash complex, 25 to 60 percent slopes	420E	Tibson, extremely bouldery-Bridger, extremely bouldery-Adel complex, 8 to 35 percent slopes
146B	Ethridge clay loam, 1 to 4 percent slopes	230C	Farnuf loam, 4 to 8 percent slopes	345D	Weedzunit-Ashbon complex, 4 to 15 percent slopes	421E	Sawicki, extremely bouldery-Bowery complex, 4 to 25 percent slopes
146C	Ethridge clay loam, 4 to 8 percent slopes	230D	Farnuf loam, 8 to 15 percent slopes	345E	Weedzunit-Ashbon complex, 15 to 45 percent slopes	422C	Work, stony-Bowery complex, 2 to 8 percent slopes
147B	Kremlin loam, 0 to 4 percent slopes	231C	Doney-Cabba loams, 2 to 8 percent slopes	346E	Farnuf-Reedwest-Shawmut complex, 15 to 35 percent slopes	422E	Work, very stony-Bowery complex, 8 to 35 percent slopes
147C	Kremlin loam, 4 to 8 percent slopes	231D	Doney-Cabba loams, 8 to 15 percent slopes	347D	Cheadle-Lymanson-Gilispie complex, 2 to 15 percent slopes	424C	Bridger, very stony-Adel complex, 2 to 8 percent slopes
147D	Kremlin loam, 8 to 15 percent slopes	232B	Work loam, 0 to 4 percent slopes	347E	Cheadle-Lymanson-Gilispie complex, 15 to 35 percent slopes	424E	Bridger, very stony-Adel complex, 8-35 percent slopes
148E	Cabbart-Cambeth complex, 4 to 35 percent slopes	232C	Work loam, 4 to 8 percent slopes	348E	Lymanson-Cheadle-Adel complex, 8 to 35 percent slopes	425E	Pintlar-Bridger loams, 4 to 35 percent slopes
150C	Kobase clay loam, 2 to 8 percent slopes	236B	Verson loam, 0 to 4 percent slopes	349D	Cheadle channery loam, 2 to 15 percent slopes	426F	Stemple-Worock complex, 35 to 70 percent slopes, very stony
150D	Kobase clay loam, 8 to 15 percent slopes	236C	Verson loam, 4 to 8 percent slopes	350F	Castner-Mowbray-Rock outcrop complex, 25 to 60 percent slopes	428F	Tibson-Whitire-Rock outcrop complex, 35 to 70 percent slopes
151C	Cabbart-Boxwell loams, 2 to 8 percent slopes	237B	Thibadeau loam, saline, 0 to 4 percent slopes	351D	Whitlash-Pianohill complex, 4 to 15 percent slopes	429E	Work-Roy, bouldery-Bigsag family complex, 2 to 35 percent slopes
151D	Cabbart-Boxwell loams, 8 to 15 percent slopes	238C	Sagedale-Cabba complex, 2 to 8 percent slopes	351E	Whitlash-Pianohill complex, 15 to 35 percent slopes	430E	Mowbray-Bridger-Novary complex, 0 to 35 percent slopes
153C	Ethridge-Reedpoint complex, 2 to 8 percent slopes	238F	Sagedale-Cabba complex, 8 to 35 percent slopes	352E	Perma-Rock outcrop complex, 15 to 45 percent slopes	431C	Bearmouth-Tiban-Beehive complex, 0 to 8 percent slopes
153D	Ethridge-Reedpoint complex, 8 to 15 percent slopes	239C	Sixbeacon gravelly loam, 2 to 8 percent slopes	353F	Ashbon-Rock outcrop-Winkler complex, 35 to 60 percent slopes	432E	Wayden-Amherst-Winifred complex, 8 to 45 percent slopes
154E	Evanston-Reedpoint complex, 8 to 35 percent slopes	241D	Yawdim clay loam, 2 to 15 percent slopes	354F	Vision-Whitlash-Rock outcrop complex, 35 to 60 percent slopes	433D	Monaberg loam, 4 to 15 percent slopes
155E	Cabbart-Delpoint loams, moist, 15 to 35 percent slopes	245C	Lonna silt loam, 2 to 8 percent slopes	355F	Doney-Cabba, moist loams, 35 to 60 percent slopes	434F	Redchief-Arrowpeak, moist complex, 15 to 60 percent slopes
156C	Twilight-Blacksheep fine sandy loams, 2 to 8 percent slopes	249B	Soapcreek clay loam, 0 to 2 percent slopes	356D	Redchief gravelly loam, 4 to 15 percent slopes	435C	Bridger clay loam, 2 to 8 percent slopes
157F	Cabbart, moist-Delpoint-Rock outcrop complex, 15 to 60 percent slopes	250A	Lallie family, silty clay, 0 to 2 percent slopes	357D	Cabba-Vershal complex, 4 to 15 percent slopes	436D	Bowery loam, 2 to 15 percent slopes
159A	Marcott cobbly clay loam, 0 to 2 percent slopes	251B	Radersburg gravelly loam, 0 to 4 percent slopes	357E	Cabba-Vershal complex, 15 to 45 percent slopes	437E	Cabba-Castner-Work complex, 4 to 35 percent slopes, bouldery
161B	Martinsdale gravelly loam, 0 to 4 percent slopes	252B	Roy-Swampcreek complex, 0 to 4 percent slopes	358E	Tongue River-Danaher loams, 15 to 35 percent slopes	438F	Wayden-Castner complex, 15 to 60 percent slopes, bouldery
161C	Martinsdale gravelly loam, 4 to 8 percent slopes	253C	Reedwest-Castner complex, 2 to 8 percent slopes	359F	Fifer-Cheadle-Monaberg complex, 25 to 60 percent slopes	439B	Fairway-Korchhea loams, channeled, 0 to 4 percent slopes
163C	Absher clay, 0 to 8 percent slopes	253D	Reedwest-Castner complex, 8 to 15 percent slopes	360D	Knep family-Warwood loams, 4 to 15 percent slopes	440C	Marmarth-Rentsac complex, 2 to 8 percent slopes
166B	Richey silty clay, 0 to 4 percent slopes	253E	Reedwest-Castner complex, 15 to 35 percent slopes	361E	Cowood very channery loam, 4 to 25 percent slopes	440D	Marmarth-Rentsac complex, 8 to 15 percent slopes
166C	Richey silty clay, 4 to 8 percent slopes	254C	Winifred clay loam, 2 to 8 percent slopes	362F	Wayden-Castner-Rock outcrop complex, 25 to 60 percent slopes	441D	Yawdim-Delpoint complex, 2 to 15 percent slopes
167F	Yawdim-Birney-Rock outcrop complex, 15 to 60 percent slopes	255B	Thibadeau, saline-Absher family complex, 0 to 8 percent slopes	363E	Kobase-Rentsac-Megonot complex, 4 to 25 percent slopes	442C	Tanna-Yawdim complex, 2 to 8 percent slopes
168D	Chinook fine sandy loam, 8 to 15 percent slopes	256F	Sixbeacon-Reedpoint complex, 15 to 60 percent slopes	364E	Absarokee-Bowery loams, 15 to 45 percent slopes	443B	Sieben-Attewan gravelly loams, 0 to 4 percent slopes
169C	Ethridge-Tanna clay loams, 2 to 8 percent slopes	257B	Absher-Bigsag families, clays, 0 to 4 percent slopes	365C	Megonot-Cabbart complex, 2 to 8 percent slopes	444C	Boxwell-Ethridge complex, 2 to 8 percent slopes
170C	Gerdum-Creed complex, 0 to 8 percent slopes	259D	Wayden clay, 2 to 15 percent slopes	366C	Tanna, calcareous.-Rentsac complex, 2 to 8 percent slopes	444D	Boxwell-Ethridge complex, 8 to 15 percent slopes
172C	Tanna-Boxwell, calcareous, complex, 2 to 8 percent slopes	260C	Wayden-Doney complex, 2 to 8 percent slopes	366D	Tanna, calcareous.-Rentsac complex, 8 to 15 percent slopes	445C	Evanston-Tanna complex, 2 to 8 percent slopes
172D	Tanna-Boxwell, calcareous, complex, 8 to 15 percent slopes	261C	Absarokee-Wayden complex, 2 to 8 percent slopes	367D	Rentsac-Reedpoint complex, 2 to 15 percent slopes	446B	Beaverell very cobbly loam, 0 to 4 percent slopes
174C	Sweetgrass clay loam, 2 to 8 percent slopes	262D	Wayden-Castner-Cabba complex, 2 to 15 percent slopes	367E	Rentsac-Reedpoint complex, 15 to 35 percent slopes	447B	Frenchcreek very gravelly loam, 2 to 4 percent slopes
176C	Reedwest-Cabba loams, 2 to 8 percent slopes	265C	Sagedale clay loam, 2 to 8 percent slopes	368E	Rentsac-Tanna-Rock outcrop complex, 8 to 35 percent slopes	448B	Attewan loam, 0 to 4 percent slopes
178F	Castner-Roy complex, 15 to 60 percent slopes	265D	Sagedale clay loam, 8 to 15 percent slopes	369D	Rentsac-Tanna complex, 2 to 15 percent slopes	449E	Redchief very stony loam, 15 to 35 percent slopes
179F	Cabba-Rock outcrop complex, 15 to 60 percent slopes	266B	Sweetgrass clay, 0 to 4 percent slopes	369E	Rentsac-Tanna complex, 15 to 35 percent slopes	450D	Sieben gravelly loam, 2 to 15 percent slopes
181C	Cabba-Winifred clay loams, 2 to 8 percent slopes	267B	Beaverton gravelly sandy clay loam, 0 to 4 percent slopes	370D	Greybear-Rentsac complex, 2 to 15 percent slopes	451F	Rentsac-Radersburg complex, 15 to 60 percent slopes
181D	Cabba-Winifred clay loams, 8 to 15 percent slopes	268B	Overfelt-Roy complex, 0 to 4 percent slopes	371D	Whitlash cobbly sandy loam, 2 to 15 percent slopes	452D	Redchief-Melville complex, 4 to 15 percent slopes
182C	Roy gravelly clay loam, 2 to 8 percent slopes	269C	Danvers loam, 2 to 8 percent slopes	371E	Whitlash cobbly sandy loam, 15 to 35 percent slopes	453D	Libeg very cobbly sandy loam, 2 to 15 percent slopes
182D	Roy gravelly clay loam, 8 to 15 percent slopes	270C	Bacbuster-Castner complex, 2 to 8 percent slopes	372D	Castner-Amherst complex, 2 to 15 percent slopes	453E	Libeg very cobbly sandy loam, 15 to 35 percent slopes
183A	Tamaneen gravelly loam, 0 to 2 percent slopes	270D	Bacbuster-Castner complex, 8 to 15 percent slopes	372E	Castner-Amherst complex, 15 to 35 percent slopes	454F	Redfern-Warwood complex, 25 to 70 percent slopes
183B	Tamaneen clay loam, 0 to 4 percent slopes	271B	Sweetgrass gravelly loam, 0 to 4 percent slopes	373D	Ticell-Castner complex, 2 to 15 percent slopes	455F	Redfern-Fifer complex, 25 to 60 percent slopes
183C	Tamaneen gravelly clay loam, 2 to 8 percent slopes	274B	Work clay loam, 0 to 4 percent slopes	374F	Cabbart, moist-Delpoint-Rock outcrop complex, 15 to 45 percent slopes	456F	Stemple-Cheadle, moist, complex, 25 to 70 percent slopes
184D	Absarokee-Shambo loams, 8 to 15 percent slopes	274C	Work clay loam, 4 to 8 percent slopes	375D	Cabbart-Rentsac, moist, complex, 2 to 15 percent slopes	457D	Arrowpeak-Gilispie-Fifer complex, 2 to 15 percent slopes
185C	Amor-Castner complex, 2 to 8 percent slopes	274D	Work clay loam, 8 to 15 percent slopes	376E	Chinook-Twilight fine sandy loams, 8 to 25 percent slopes	458C	Vebar-Castner complex, 2 to 8 percent slopes
185D	Amor-Castner complex, 8 to 15 percent slopes	274E	Work clay loam, 15 to 35 percent slopes	377F	Tongue River-Cabba, moist-Adel loams, 15 to 60 percent slopes	459A	Newtman muck, 0 to 2 percent slopes
186D	Castner channery loam, 2 to 15 percent slopes	275B	Overfelt clay loam, 0 to 4 percent slopes	378D	Melville cobbly loam, 2 to 15 percent slopes, stony	460B	Foolhen-Beehive-Bearmouth complex, 0 to 4 percent slopes
186E	Castner channery loam, 15 to 35 percent slopes	276A	Larry clay loam, 0 to 2 percent slopes	379F	Tongue River-Arrowpeak, moist complex, 15 to 60 percent slopes	461B	Soapcreek-Absher family complex, 0 to 4 percent slopes
188C	Linwell clay loam, 2 to 8 percent slopes	277B	Marcott-Larry complex, 0 to 4 percent slopes	381E	Duckcreek-Arrowpeak complex, 8 to 45 percent slopes	DA	Denied access
189C	Shambo gravelly clay loam, 2 to 8 percent slopes	278B	Perma gravelly loam, 0 to 4 percent slopes	382E	Fifer-Knep complex, 15 to 45 percent slopes	M-W	Water, miscellaneous
190C	Danvers gravelly clay loam, 2 to 8 percent slopes	278C	Perma gravelly loam, 4 to 8 percent slopes	383D	Fifer-Rock outcrop complex, 4 to 15 percent slopes	W	Water

CONVENTIONAL AND SPECIAL
SYMBOLS LEGEND

SOIL SURVEY FEATURES

CULTURAL FEATURES

SOIL DELINEATIONS AND SYMBOLS



Borrow pit	⊠
Clay spot	✱
Depression, closed	◆
Escarpment, nonbedrock	ΛΛΛΛΛΛΛΛΛΛ
Gravel pit	⊗
Gravelly spot	⋯
Gully	~~~~~
Levee	
Marsh or swamp	≡
Mine or quarry	⊗
Perennial water	⊙
Rock outcrop	▼
Saline spot	+
Sandy spot	✱
Short steep slope
Slide or slip	⌋
Sodic spot	∅
Stony spot	○
Very stony spot	⊙
Wet spot	ψ

AD HOC FEATURES

Calcareous spot	≡
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
















BOUNDARIES

County or parish	— - —
Reservation (national or state forest or park)	— - —
Limit of soil survey (label)	—
Map sheet neatline	—
Public land survey system section boundary	—

ROAD EMBLEMS & DESIGNATIONS

Interstate	
Federal	
State	

Symbol Definitions

LABEL	NAME	DESCRIPTION
	Borrow pit	An open excavation from which soil and underlying material have been removed, usually for construction purposes. Typically less than 5 acres.
	Calcareous spot	A soil surface layer with calcium carbonate equivalent that is 5 percent greater than the surface layer of the named soils in the surrounding map unit. Typically less than 5 acres.
	Clay spot	A spot where the surface texture is silty clay or clay in areas where the surface layer is sandy loam, loam, silt loam, or coarser. Typically less than 5 acres.
	Depression, closed	A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and is without a natural outlet for surface drainage. Typically less than 5 acres.
	Escarpment, nonbedrock	A relatively continuous and steep slope or cliff, which generally is produced by erosion but can be produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.
	Gravel pit	An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel. Typically less than 5 acres.
	Gravelly spot	A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area of surrounding soil with less than 15 percent fragments. Typically less than 5 acres.
	Gully	A small channel with steep sides cut by running water and through which water ordinarily runs only after a rain or after ice or snow melts. It generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage.
	Levee	An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow on lowlands.
	Marsh or swamp	A water-saturated, very poorly drained area, intermittently or permanently covered by water. Sedges, cattails, and rushes dominate marsh areas. Trees or shrubs dominate swamps. Not used in map units where the named components are "poorly drained" or "very poorly drained." Typically less than 5 acres.
	Mine or quarry	An open excavation from which soil and underlying material are removed, exposing the bedrock. Also used to denote surface openings to underground mines. Typically less than 5 acres.
	Perennial water	Small, natural or constructed lake, pond, or pit that contains water most of the year. Typically less than 5 acres.
	Rock outcrop	An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit. Typically less than 5 acres.
	Saline spot	An area where the surface layer has an electrical conductivity (EC) of 8 mmhos cm ⁻¹ more than the surface layer of the named soils in the surrounding map unit, which have an EC of 2 mmhos cm ⁻¹ or less. Typically less than 5 acres.
	Sandy spot	A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils of the surrounding map unit is very fine sandy loam or finer. Typically less than 5 acres.
	Short, steep slope	Narrow soil area that has slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.
	Slide or slip	A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces. Typically less than 5 acres.
	Sodic spot	An area where the surface layer has a sodium adsorption ratio that is at least 10 more than the surface layer of the named soils in the surrounding map unit, which have a sodium adsorption ratio of 5 or less. Typically less than 5 acres.
	Stony spot	A spot where 0.01 to 0.10 percent of the surface cover is rock fragments that are greater than 10 inches in diameter in areas where the surrounding soil has no surface stones. Typically less than 5 acres.
	Very stony spot	A spot where 0.1 to 3.0 percent of the surface cover is rock fragments that are greater than 10 inches in diameter in areas where the surrounding soil has less than 0.01 percent of a surface cover of stones. Typically less than 5 acres.
	Wet spot	A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit. Typically less than 5 acres.